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ABSTRACT

This report resulted from visits to over 50 organizations in the Air Force, Army, Navy, and in the civilian sector, automated and manual searches of journals, and computerized databases. This report is a comprehensive annotated bibliography of the literature on productivity measurement and enhancement. The report is organized into four sections: Introduction, Methodology, Organization of the Annotated Bibliography, and the Annotated Bibliography. The latter contains 339 citations organized into five categories: (1) Productivity--An Overview; (2) Productivity and Quality of Working Life Improvement; (3) Productivity and Quality of Working Life Case Studies; (4) Productivity Measurement; and (5) Related Bibliographies. (Author/GK)

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MEASURING AND ENHANCING ORGANIZATIONAL PRODUCTIVITY: AN ANNOTATED BIBLIOGRAPHY

By

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MANPOWER AND PERSONNEL DIVISION
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The report resulted from visits to over 50 organizations in the Air Force, the Army, the Navy, and in the civilian sector, automated and manual searches of journals, and computerized data bases. This report is a comprehensive annotated bibliography of the literature on productivity measurement and enhancement.

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SUMMARY

Objective

This report provides a comprehensive annotated bibliography of the literature on productivity measurement and enhancement.

Background

Largely because of pressure on the Military Services to justify budget requests, concern about productivity has increased in the Department of Defense (DoD), particularily in the Air Force. In response to requirements from the White House and the DoD that government productivity be improved, the Air Force completed a comprehensive productivity improvement plan in November 1979. This plan directs all major commands and operating agencies to develop their own productivity plans, to appoint "productivity principals" as contact persons for productivity matters, and to report productivity accomplishments annually to Air Force headquarters.

To fulfill their responsibilities under this plan, both productivity principals and operating managers should understand the meaning of productivity in the Air Force environment and should learn about the available approaches to productivity enhancement.

Approach

The references pertaining to productivity cited in the bibliography were compiled from automated and manual searches of journals and computerized data bases. In addition, relevant documents and references were obtained from visits to over 50 organizations in the DoD (Air Force, Army, and Navy) and in the civilian sector. Annotations focus on summaries and conclusions, and selectively include author affiliations and methodological considerations.

Specifics

The report is organized into four major sections: Introduction, Methodology, Organization of the Annotated Bibliography, and the Annotated Bibliography. The Annotated Bibliography contains 339 citations organized into five major categories:

Productivity — An Overview
Productivity and Quality of Working Life Improvement
Productivity and Quality of Working Life Case Studies
Productivity Measurement
Related Bibliographies

Conclusion

This bibliography provides a comprehensive compilation of relatively recent references dealing with the subjects of productivity measurement and enhancement.

PREFACE

As part of an Air Force Human Resource Laboratory (AFHRL) contract research effort, Taxonomy and Codification of Productivity Criteria, Contract No. F 33615-79-C-0019, an extensive literature review was conducted. The review focused primarily on approaches to measuring productivity of organizational units. The definition of productivity was a broad one encompassing the concepts of efficiency and effectiveness. The review also included studies of methods of enhancing productivity, giving precedence to those which made use of "hard" criteria in the evaluation or measurement of results. This report provides an annotated bibliography of studies in these two categories. The volume of published material in the areas of productivity and organizational effectiveness measurement and enhancement is vast and has increased greatly in recent years. This bibliography represents a comprehensive coverage of this literature.

The research effort was completed under AFHRL Work Unit 77340810. It is part of a larger effort to establish a comprehensive skills and management program to improve personnel utilization, retention and productivity. To develop an effective force management system, research is needed to provide Air Force managers with devices, models, and strategies to improve evaluation of unit productivity.

Appreciation is expressed to the AFHRL technical project monitor, Dr. Charles N. Weaver, for his valuable comments and suggestions. Appreciation is also expressed to the previous AFHRL project monitors who provided significant assistance in the earlier phases of the research: Major John O. Edwards, Jr., Dr. William E. Alley, Dr. Joe T. Hazel, and Mr. William L. Titsworth. The authors also thank Ms. Terri Hartman of the University of Maryland for her assistance in conducting library research, to Ms. Elizabeth C. Clark for her able administrative and clerical support, and to the University of Maryland Computer Science Center for data processing support in automating the bibliography.

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MEASURING AND ENHANCING ORGANIZATIONAL PRODUCTIVITY: AN ANNOTATED BIBLIOGRAPHY

I. INTRODUCTION

Productivity has become a major concern for the Air Force, the Department of Defense (DoD) and the United States as a whole. In public organizations, productivity improvement has taken on increased importance as the demand for services has increased faster than the tax revenues which support them. While many approaches to the improvement of productivity have been explored, progress in the field has been substantially hampered by the absence of a widely accepted definition of productivity and by the limited number of adequate criteria for measuring productivity.

Another difficulty facing those who would enhance productivity has been the absence of a well-defined body of productivity literature. Since the subject is inherently cross-disciplinary, productivity-related literature is found in many fields, including engineering, economics, industrial psychology, industrial sociology, accounting and finance, operations research, and management. Furthermore, the research has been conducted in a wide variety of organizational types and levels, which increases the difficulty of making gereralizations. There are studies of productivity at the industry level, or at the Major Command level for Air Force organizations, as well as studies of the productivity of individuals and work groups. Productivity improvement methods are usually specific to the functional area and in many cases even to the organization itself. Thus, those interested in improvement are substantially handicapped if they cannot locate research which relates directly to their individual problem. For example, productivity measures and improvement methods in one functional area, e.g., security police, will usually bear little, if any, relationship to applicable productivity measures or improvement methods in another functional area such as pavements maintenance.

The purpose of this bibliography is to assemble as much of the diverse body of organizational productivity literature as practicable, to organize it into meaningful categories, and to provide annotations in sufficient detail that a reader can decide whether or not to pursue a particular reference.

II. METHODOLOGY

The literature review strategy involved a combination of methods, including automated literature searches, manual searches, examination of existing bibliographies, and identification of manuscripts and documents discovered during field visits to Air Force, Army, Navy, Department of Defense and civilian organizations. Each of these methods is briefly described below.

Automated Literature Searches

During the literature identification and acquisition phase of the project, six automated literature searches were used. These are identified and described in Table 1.

Table 1

Automated Searches Used to Locate Relevant Published Literature

Search Name	Body of Literature Covered	Search Coverage
SCORPIO	Library of Congress Collection	1975-1980
DIALOG	Literature of Business/Management, Finance and Accounting, Economics, and Administrative Sciences	1975-1980
PASAR	Literature of Behavioral and Social Sciences, Personnel Management, Organizational and Personnel Psychology, Organizational Development, and Applied Psychology	Last 10 Years
NTISearch	Collection of the National Technical Information Service, U.S. Department of Commerce	1964-1978
DTIC Search	Collection of the Defense Technical Information Center	Prior to 1979
DLSIE Search	Collection of the Defense Logistics Studies Information Exchange	Prior to 1980

The key word descriptors used in the automated search process were productivity measurement, productivity, organizational effectiveness, and measurement of organizational efficiency/effectiveness. The resulting citations were screened, and if judged relevant, hard copies were obtained. A citation was considered relevant if it reported research concerned with the definition of productivity, quality of working life,

or organizational effectiveness, or if it reported efforts to measure these constructs using "hard" criteria.

Manual Searches

In order to discover references which were too recent to have been included in the automated data bases, manual searches were conducted for the last 5 years of the most relevant journals. Journals searched manually were

Academy of Management Journal

Administrative Science Quarterly

American Sociological Review

Harvard Business Review

Industrial Engineering

Journal of Applied Behavioral Science

Management Accounting

Organizational Behavior and Human Performance

Personnel Administration

Personnel Journal

Personnel Psychology

Psychological Bulletin

Field Visits

Under this contract, visits were made to over 50 organizations, including the Department of Defense, Air Force Major Commands, Air Force Headquarters, Army, Navy, and civilian organizations. The major purpose of the visits was to gather information on approaches to productivity measurement and evaluation of organizational change programs. However, the visits also produced a number of the documents, articles, and technical reports included in this bibliography. Through personal meetings with researchers, reference materials were obtained that would have been difficult to find through other means.

Criteria for Including References

It is important for the reader to know that this bibliography was developed not as an end in itself. It is an interim step in the development of a taxonomy of productivity criteria and an effort to identify successful, behaviorally oriented productivity enhancement methods.

The principal criterion of inclusion was that a particular citation referred to efforts to define or measure productivity, quality of working life, or organizational effectiveness using so-called hard criteria. "Hard criteria" refer to measures whose units are physically countable or observable. This focus led to a consideration of research which focused on productivity measurement methodology as an end in itself. It

also led to a much larger universe of research in which measurement approaches were discussed in the context of evaluating the results of productivity enhancement efforts. This bibliography sought comprehensive coverage of the universe of studies focusing on measurement. However, since the bibliography was an interim step, it seemed more important for the review to sample references from a broad range of enhancement approaches than to ensure that every source about every specific approach was included. Given the range of relevant topics, exhaustive coverage would have been far beyond the scope of the project's resources. For the readers interested in more complete coverage of particular enhancement methods, the bibliographies provided at the end of the review should prove useful.

III. ORGANIZATION OF THE ANNOTATED BIBLIOGRAPHY

The annotated bibliography has five major sections:

Productivity -- An Overview

Productivity and Quality of Working Life Improvement

Productivity and Quality of Working Life Case Studies

Productivity Measurement

Related Bibliographies

The first section, Productivity -- An Overview, includes citations that provide a general introduction to the meaning of productivity in various organizational environments or contexts. The second major section, Productivity and Quality of Working Life Improvement, includes citations dealing with organizational change programs designed to improve productivity and quality of working life. The focus on enhancement efforts is continued in the third section, Productivity and Quality of Working Life Case Studies; references are included in this section to collections of cases which describe organizational interventions and their outcomes in a variety of organizational settings. The fourth section, Productivity Measurement, deals with techniques for quantifying organizational outcomes, the major focus of the bibliography. The final section, Related Bibliographies, will assist the reader in locating additional reference material on productivity and quality of working life measurement and improvement.

Productivity -- An Overview

This major section includes citations which provide an introduction to the diverse body of productivity literature. Included are references to literature dealing with theoretical and conceptual issues, definitions of productivity and quality of working life, and even with "expert" opinion as to how productivity should be improved. In addition, the section contains references dealing with broad national or federal department-wide concerns which, while not the primary focus of this bibliography, have important implications for productivity at the working levels of government organizations.

Productivity and Quality of Working Life Improvement

Many behaviorally oriented efforts to improve productivity have been attempted. This section highlights a number of these efforts and organizes the literature on the subject into nine categories. While not mutually exclusive, the categories are sufficiently distinguishable to improve the accessibility of this diverse literature.

Productivity and Quality of Working Life Case Studies

The references annotated in this section represent publications which review, organize, and summarize parts of the productivity literature.

Productivity Measurement

Of all the productivity literature, the literature on measurement is perhaps the most fragmented. This section provides a broad view of the subject of productivity measurement. As in the section on productivity and quality of working life improvement, the categories are not mutually exclusive, but they are sufficiently distinct to assist in organizing this diverse body of literature. Some clarification of the meaning of the categories is appropriate.

1. Effectiveness Measurement - This category includes references which focus on the measurement of effectiveness defined as the extent to which an organization achieves its stated goals. Most studies which report effectiveness measures have multiple criterion measures, one of which may be productivity as traditionally defined, ratio of outputs to inputs.

2. Performance Appraisal/Performance Measurement - While the review focuses primarily on measurement at the organizational level, it was not possible to ignore measurement of individual outcomes. This section includes studies dealing with performance appraisal and the measuring of individual output and performance. This category is distinguished from the previous one in its emphasis on the performance of individuals and from the following one by an absence of concern with inputs.

3. Efficiency Measurement - This category includes studies of productivity as traditionally and narrowly defined as a ratio of outputs to the inputs used to produce them. It includes partial productivity ratios (e.g., output per hour worked and output per BTU of energy consumed) as well as total factor productivity where all relevant inputs (e.g., labor, capital, materials, energy) are included in the denominator of the efficiency ratio.

4. Quality of Working Life Measurement - This category includes those references which seek to measure quality of working life outcomes.

5. Work Measurement - This category includes a range of studies which define performance standards and then assess actual work performed in relation to these standards. It includes techniques of industrial engineering such as work sampling and motion-time measurement.

6. Human Resource Accounting - A growing field which attempts to place economic values on human resources and human behaviors is called human resource accounting. This category provides a sample of references from this field.

7. Program Evaluation - This category includes studies which measure outcomes to determine whether a particular organizational change program met its goals and also to assess how subsequent program implementations might be improved. While some of the methods of measuring program effectiveness may resemble the measurement methods used in other

categories, the focus of literature in this category is on the program itself rather than the organization.

8. Financial Ratio Analysis - A useful and widely practiced means of measuring organizational performance, especially in the accounting field is financial ratio analysis. A small sample of this literature is presented in this section.

9. Other Measurement Approaches - This category includes literature of interest which does not fit into any of the other categories.

Related Bibliographies

This section includes annotated bibliographies that pertain to the topics of productivity and quality of working life. The reader interested in additional sources should find these bibliographies helpful.

IV. ANNOTATED BIBLIOGRAPHY

1. Productivity -- An Overview

1 Block, H. R., Marlin, J. W., Jr., Wiest, P. R., & Snavely, W. C. A compilation of methodological problems confronting the Air Force in the fields of economics and management. AD-A043360. Arlington, VA: Final report under Air Force Office of Scientific Research Grant 77-3168. The Center for Economic Analysis, 1977.

Based on field interviews with more than 75 individuals in Air Force Headquarters and non-combat commands, the major methodological problems in the area of management and economics confronting the Air Force and amenable to basic research were identified and were grouped into five categories: (1) Output and benefits; (2) Costs; (3) Air Force - Contractor Relationships; (4) Management; (5) Forecasting and projection. The problem of output measurement was given paramount importance.

2 Davis, L. E., Cherns, A. B., & Associates (Eds.). The quality of working life: Vol. 1. Problems, prospects and the state of the art, New York: The Free Press, 1975.

Includes a group of 28 selections prepared for and resulting from the 1972 International Conference on the Quality of Working Life. Selections are grouped under the following headings: Enhancing the Quality of Working Life, Defining and Measuring the Quality of Working Life, Changing the Quality of Working Life, Technology and Quality of Working Life, Quality of Working Life - The Context of Change, Quality of Working Life - The Context of Bargaining, Quality of Working Life - A Central Issue in Industrial Relations.

3 Fuchs, V. R. (Ed.). Production and productivity in the service industries, New York: National Bureau of Economic Research, 1969.

Presents a collection of essays dealing with the problems in a macro economic approach to measuring productivity in service industries. Not oriented to those interested in plant level productivity measurement.

4 Ghorpade, J. Assessment of organizational effectiveness: Issues, analysis, and readings. Pacific Palisades, CA: Good Publishing Company, 1971.

A basic collection of readings on the topic of "organizational effectiveness." The selections are grouped into four major categories: Theoretical Consideration, Criteria, Recent Studies and Methodology. Includes both classical articles (e.g. Georgopoulos and Tannenbaum; "A study of organizational effectiveness") and more recent contributions (Ghorpade;, "Toward a methodology for the study of organizational effectiveness").

5 Heaton, H. Productivity in service organizations. New York, NY: McGraw Hill, 1977.

Challenges many prevailing assumptions about existing methods of organization and their impacts on people. Makes a case for the impact of measures on the phenomenon being measured and argues convincingly for measures of effectiveness in service organizations as well as measures of efficiency.

6 R & D productivity: An investigation of ways to evaluate and improve productivity in technology-based organizations. Culver City, CA: Hughes Aircraft Company, 1978.

This document reports the findings of a 5-year productivity study effort. Basic principles of productivity are identified in order to stimulate readers to think and take action to improve personal and organizational productivity. Findings and recommendations are based on the participation of 59 major organizations, surveys of 2,350 R&D managers and senior technical personnel, the services of 28 prominent consultants, attendance at 23 productivity seminars, and an extensive literature search. This is an excellent report that details the nature of productivity improvement and lists many insightful ways to improve operational, managerial, and employee productivity. An exceptional topical bibliography and reading list is included for persons wishing to investigate all aspects of productivity in more detail.

7 Kendrick, J. W. Understanding productivity, Baltimore, MD: The Johns Hopkins Press, 1977.

This book by one of the nation's leading authorities on productivity from an economics perspective provides an excellent summary of current thinking about productivity in the U.S. From his vantage points as a former chief economist for the U.S. Department of Commerce and now as a professor of economics, the author provides a lucid view of the productivity problems, the nearing of productivity, current trends by industry and sector and prospects for the future. The book also includes a useful analysis of the role of productivity measurement in promoting improvements both at the national level and at the level of the firm.

8 McBeath, G. Productivity through people: A practical guide to improvement. New York: John Wiley & Sons, 1974.

A broad ranging treatment of the areas to consider in productivity improvement. The book presents practical suggestions based on the author's experience and some case studies. It has a very superficial treatment of measurement issues but a good section on the diagnosis of productivity problems.

9 Annual report to the President and Congress. Washington DC: National Center for Productivity and Quality of Working Life, December 1977.

Cites the data as of 1977 showing the nation's downturn in the rate of productivity growth. Describes the National Center's activities and is a good basic reference for those interested in the macro aspects of productivity. Special emphasis is given to a description of activities to increase the contribution of human resources, to advance the use of capital and technology, and to stimulate special efforts in the mining, food distribution, and public sector programs. A brief discussion of Bureau of Labor Statistics measurement procedure is provided.

10 Newland, C. A. Personnel concerns in government productivity improvement. Public Administration Review, 1972, 32 (6), 807-815.

The author discusses (1) productivity bargaining, (2) formal production incentive systems, (3) manpower planning, and (4) behavioral science and organizational design. He argues for developing situational prescriptions to productivity problems rather than adopting other experiences indiscriminately. According to the author, the greatest gains in productivity result from the optimum combination of the factor inputs of people, capital and natural resources rather than from any one input taken alone. This points the way for more input from the behavioral sciences.

11 Rann 2, realizing knowledge as a resource, Volume 3: Improving productivity. NTISPB 275 907. Washington, DC: National Science Foundation,

This is a report of the proceedings of an NSF Research Applied to National Needs (RANN) Symposium which focused on (1) productivity in manufacturing, (2) industry-university cooperation as an approach to increasing knowledge about productivity, and (3) productivity in administrative services. Representative projects include: (1) new technology for improved tunnel-boring in underground excavation; (2) a computer-controlled system for the cold-forming of ship frames; (3) geometric specification to advance mechanical drawing; (4) joint university-industry furniture research and development institute to explore new approaches to manufacturing; and (5) an analysis of staffing patterns in city government to improve administrative services productivity.

12 Ross, J. E. Managing productivity. Reston, VA: Reston Publishing Company, 1977.

The principal thesis of this book is that better productivity results from better management. Given this assumption, the author goes on to write a book about management and management methods. It includes a number of self audits and checklists on various topics which may assist one to analyze one's own management style.

13 Sutermeister, R. A. People and productivity. New York, NY: McGraw-Hill, 1963.

Presents and discusses a descriptive model of 33 factors affecting productivity of individuals. The model is very useful as a device for viewing productivity problems in context. Sutermeister stresses that the model is tentative and does not address the importance of each of the factors since their relative importance varies between organizations. The book also includes over 30 readings related to aspects of the model, many of which are classics.

1.1. Productivity Measurement Overview

14 Balk, W. L. Technological trends in productivity measurement, Public Personnel Management, 1975, 4 (2), 128-133.

Describes an approach to productivity measurement based on a conceptualizing of task ambiguity. As tasks become less routine and more ambiguous, the appropriate productivity measurement method shifts from that of engineered work standards to group productivity ratio to non-subjective measures. This is a very lucid and provocative article and its implication for managing organizations is briefly noted.

15 Baytos, L. M. Nine strategies for productivity improvement. Personnel Journal, 1979, 58 (7), 449-456.

The author presents a list of strategies, their target groups, and how they can improve productivity, for example, by identifying unneeded layers of organization, by reducing costs for lost-time accidents and illnesses, and by obtaining greater contributions by all employees to efficient operations. The author argues for placing productivity improvement (PI) responsibilities in the personnel department, stating that "an important contribution of the personnel professional is to make sure that the Productivity Improvement effort is organizationally sound."

16 Brav, S. Productivity, performance and the management audit, Public Utilities Fortnightly, 1976, 98 (8), 28-31.

Provides a useful discussion of the advantages of total factor productivity over partial (labor) productivity. The author compares and contrasts three types of management studies, ratio analysis, econometric analysis, and the management audit with respect to five criteria of an ideal efficiency study. The context for the discussion is the electric utility industry and its need to justify its rate structure to regulatory agencies.

17 Broedling, L. A>, & Penn, R. (Eds.). Military productivity and work motivation: Conference proceedings. San Diego, CA: Navy Personnel Research and Development Center, NPRDC SR78-15, August 1978.

Reports the proceedings of a conference to address the issue of productivity in the military. Papers and questions and answer sessions reported and cover: (I) Problem Identification; (II) Approaches to Problem Resolution: and (III) Projection of Future Needs.

18 Burdeau, H. B. Productivity - To be or not to be. Journal of Systems Management, 1976, 27 (1), 28-29.

A critique of existing national productivity measurement approaches which focus on output per man-hour. The author cautions that productivity measures are at best imperfect and should be used with caution and with the full knowledge of what is being measured or monitored. This caution is especially pertinent as productivity measures are subject to misuse by individuals who are "far removed" organizationally from that which is being measured.

19 How to promote productivity. Business Week, July 24, 1978, pp. 146-151.

Discusses the status of productivity center programs in the private sector. Comments from prominent individuals address the problems of measurement, the relationship between productivity and quality of working life, and some of the benefits that have resulted from successful innovations, e.g. lowered glass breakage, fewer rejects, lower absenteeism. The article also points out the need to consider both efficiency and effectiveness since an organization can be very productive (efficient) but going out of business if it is producing the wrong product.

20 Japan paces the world. Business Week, September 9, 1972, p. 118.

A brief article which attempts to explain why the Japanese have become the acknowledged leaders in terms of productivity and product quality. Factors mentioned are characteristics of the worker, high rate of capital investment, weeding out industry with low productivity and the virtual absence of strikes. Since the 1950's, labor and management have cooperated on issues that would impact productivity. Quality control circles are briefly noted as a productivity enhancement approach.

21 The trouble with productivity overseas. Business Week, September 9, 1972, pp. 112-115.

Analyzes productivity related developments in Germany, Great Britain, Italy, and Sweden. A number of experiments are underway to improve productivity performance and to better fit jobs to the desires of workers. The article covers a broad spectrum but provides little insight into the operation of various programs such as the team approach at Volvo in Sweden.

22 Gellerman, S. W. Who's against productivity? The Conference Board Record, 1973, 10 (9), 39-43.

Argues that productivity changes within organizations are really political problems within the organization rather than a technical or industrial relations problem. Meaningful productivity change comes as a result of changes in the culture of an organization, e.g., what is acceptable as a standard of performance. This encounters resistance because people have to give up or modify traditional ways of responding. However, the alternative, not having meaningful productivity change means giving up a great deal more.

23 Imberman, A. A. The low road to higher productivity. The Conference Board Record, 1975, 12 (1), 29-37.

The author, an experienced management consultant, offers his advice about approaches that fail to produce productivity improvements. His thesis is that there are many popular devices to improve morale and productivity, but they are largely ineffective. The author emphasizes that there are no shotgun remedies and that managers should follow Douglas McGregor's advice, "In order to cope with reality, one must know what reality is." He suggests that managers learn about reality by listening to workers.

24 Jacobs, H., & Jillson, K. Executive productivity, New York: American Management Association, undated.

This report summarizes the responses of 1,275 business executives, including 530 company presidents, to a survey on the importance of executive productivity. Respondents felt that productivity problems occur most often in non-managerial areas but that these problems were usually caused by poorly defined goals and inadequate leadership. Ninety-six percent of those surveyed believed that productivity improvement would help accomplish organizational goals such as profit improvement, return on investment, product quality or ability to attract capital. Many other results are presented in this interesting report. In general, executives felt that productivity improvements would come from decentralization of decision making, employee development, and better understanding of organizational goals.

25 Katzell, M. Productivity: The measure and the myth, New York: AMACOM, 1975.

Reports the results of an AMA survey of chief executive officers and personnel/industrial relations (IR) officers views regarding productivity me and enhancement. Respondents were equally split between general managers and personnel/I.R. representatives and represented a response ratio of 16.6%. The results suggest that respondents adopt a broad view of productivity which includes output per man-hour as well as quality of output, adherence to standards and absence of complaints. Most fruitful approaches to enhancing productivity were viewed as better planning, more effective management, better training, improved job procedures, improved communications, and more incentives for performance.

26 Moski, B. A. Productivity and the quality of life. S. A. M. Advanced Management Journal, 1973, pp. 15-22.

The author describes the combinations of financial and non-financial incentives which have kept production high and workers happy in two electric utilities. The article is anecdotal and exhortative in nature.

27 Measurement and interpretation of productivity., Washington, DC: National Academy of Sciences, 1979.

A blue ribbon panel of national productivity experts were brought together by the National Academy of Sciences with support from the National Center for Productivity and Quality of Working Life to review approaches to the measurement of productivity in the U.S. economy. The book summarizes the recommendations of this panel and includes 10 papers prepared by individual panel members. The principal focus of the report is on national and industry level statistics, although one paper focuses on firm level measurement in hospitals.

28 Steiner, R. L. Marketing productivity in consumer goods industries -- a vertical perspective. Journal of Marketing, 1978, 42 (1), 60-70.

Describes a macro economic approach to measuring and analyzing productivity in two consumer goods industries--women's outerwear and toys. The author proposes a "vertical" model which measures final outputs at the retail level rather than at the manufacturing level. In addition, inputs include both capital and labor inputs for marketing as well as production operations.

29 Thor, C. G. Address given to the American Feed Manufacturers Association. St. Louis, MO: May 8, 1978.

Excellent discussion of the basics of productivity measurement. Covers definition of productivity, types of measures (partial and total factor), benefits of measurement, problems with partial measures, and the place of measurement in a total productivity improvement program.

30 United States Office of Personnel Management. Manager's Guide for Improving Productivity. Washington, DC: U.S. Government Printing Office, 1980.

This guide provides a useful framework for planning and implementing a productivity improvement program. It also lists resource materials that are available to assist Federal managers.

31 Walker, F. W., Jr. Productivity, profits and business ethics. Advanced Management Journal, July 1973, pp. 2-8.

A vice president of General Motors of Canada shares his perspectives about the meaning of productivity and its impact on the work force, economy and the firm. Discusses the meaning of productivity as getting more output for the same amount of human effort. The article also stresses that productivity has benefitted labor in the past because it paved the way for a better standard of living.

1.2. Productivity in Local Government

32 Balk, W. L. (Ed.). A symposium on productivity in government. Public Administraion Review, 1978, 38 (1), 1-50.

Eleven articles present a wide range of views and summarize the 5-year progress of public productivity improvement programs since the first Review symposium (November/December 1972). Productivity analysts and public leaders examine the urgent challenge of declining national productivity. Also discussed are federal and state/local efforts to improve programs and delivery of services; private and public sector productivity improvement programs; union leaders and agency managers' responses to productivity programs; definitions, terms, and concepts of productivity; traditional and innovative productivity measurement methods; and the future of public sector productivity policy. The symposium provides a progress update for the reader and integrates the "major strands of government productivity experience and knowledge."

33 Hamilton, E.K. Productivity: The New York City approach. Public Administration Review, 1972, 32 (6), 784-795.

The Deputy Mayor of New York City summarizes the rationale and early results of Mayor John Lindsay's productivity improvement program begun in the early 1970s based on the belief that the public has a supreme right to know the specific benefits of "invested" tax dollars and that improvements must be measurable in hard, quantitative terms wherever possible. That governmental productivity is hard to define and measure or that profits are not made in the public sector are mere excuses for not proceeding with productivity improvement efforts. By reducing the number of agencies drastically, using advanced analytic techniques and computerized information systems, and initiating program-performance budgeting, the New York City program has begun to achieve significant increases/improvements in the quantity and quality of delivered public services, especially where improvement projects have been introduced in the areas of rat control, park cleaning, street patching, sanitation vehicle maintenance, response to fires, dispatch of police, capital construction, food (vendor) control, introduction of technological innovations in service delivery and computer utilization.

34 Hatry, H. Issues in productivity measurement for local government. Public Administration Review, 1972, 32 (6), 776-784.

This article summarizes problem, solutions, and motivators in the measurement of productivity by local governments. Problems include the measurement of changes in quality, measures which tend to encourage employees to make decisions not in the public interest (such as measuring police by counting number of arrests), and lack of uniformity between jurisdictions. Solutions include a representative list of workload measures, quality measures, and intervening variables to be taken into account.

35 Holzer, M. (Ed.). Productivity in public organizations. Port Washington, NY: Kennikat Press, Dunellen Publishing Co., 1976.

Defines a managerial framework for increasing productivity in the public sector. Utilizing that framework as an organizing device, presents 25 selected readings which discuss (1) political, managerial, and economic pressures for public sector productivity; (2) means to measure productivity; (3) catalysts to improved output, e.g., labor relations, capital investment, management auditing, and supervisory style.

36 Morley, E. Productivity: Progress and prospects. Baltimore, MD: Paper presented at the 1979 Annual Meeting of the American Society for Public Administration, April 1979.

Provides a thorough well-written review of the status of productivity definition, measurement, and improvement efforts in local government. The author draws some implications regarding future trends in productivity improvement in these jurisdictions and points out some of the needs.

37 An approach to productivity improvement in the public sector: A procedural manual. PB 253 645. Nassau County, NY: Nassau County Multi Municipal Productivity Project, 1975.

Describes a four-stage productivity enhancement program based on the premise that the productivity of municipal services is measurable and can be improved through systems analysis by trained analysts. Program involves four stages: (1) attitudinal survey, (2) micro stage (training period and pilot program), (3) macro program (installing the methodology system-wide), and (4) productivity bargaining to share savings. A training manual, glossary, and other reference material are appended.

38 Newland, C. A. (Ed.). A symposium on productivity in government. Public Administration Review, 1972, 32 (6), 739-850.

An entire issue of this journal is devoted to the proceedings of a symposium on public sector productivity. It includes a collection of 14 well written articles by 23 authors. The symposium was held to inform individuals interested in public administration about current productivity concerns, problems, practices, and controversies in the public sector. Topics examined include: the national economic context and definitions/measures of productivity; productivity improvement in the Defense Supply Agency; measurement and management of productivity in local government programs in New York City, Wisconsin, and California; capital expenditures, budgeting, personnel concerns, and employment trends as they impact on productivity improvement efforts; and a critique of the "productivity movement."

39 Productivity improvement manual for local government officials, Distributed at North Carolina's Governor's Conference on Governmental Productivity, February 15-16, 1979, Raleigh, NC.

Provides background and a step-by-step procedure for developing and implementing a productivity program. Emphasis is on the public sector where the squeeze exists between the available tax base and demands for additional services. Discusses productivity improvement techniques for personnel, facilities, equipment, and capital. Discusses the difficulty of and necessary steps for successful productivity measurement. Recognizes problems in introducing a productivity improvement program and suggests ways to overcome the difficulties.

40 Stevens, J., & Webster, T. Public safety productivity. Public Productivity Review, 1979, 3 (3), 29-42.

This article focuses on a mutual problem identification-problem solution approach to improving fire and police productivity in three small-medium cities. The principal thesis is that for success there must be interaction among the analyst, top level city officials and line managers and employee representatives. The article concludes that the process of implementing productivity improvements: (1) has to be developed with the active participation of top level officials; (2) requires extensive preparation and "acceptance building"; (3) should initially focus on substantive organizational issues and proceed in accordance with mutually set priorities; (4) must anticipate the effects of feeding back information; and (5) must make key individuals aware of the need to plan for implementation early in the problem analysis and solution process.

1.3. Productivity in the Federal Government

41 Bennewitz, E. Work measurement essential to resource management. Defense Management Journal, October 1972, pp. 30-35.

The Deputy Comptroller of the Army reports on the Army's participation in the General Accounting Office/Office of Management and Budget/ Civil Service Commission Productivity Measurement Project (PMP) first announced in 1971. Work measurement, based on summary data for resource inputs and performance outputs over time, has been used by the Army in nontactical operations for many years as indicators of productivity trends. Based on an Army-wide "horizontal" slice of data for 18 program budget elements, indexes of Army productivity are generated for fiscal years 1967 to 1971. These indexes, plotted for output, man-years, and overall productivity over the period, showed decidedly upward trends. Emphasis is placed on using valid and reliable performance measurement data for more effective budgeting, programming, scarce resource allocation, and management control.

42 Bryant, A., Shallman, W., Wagner, P., & Young, J. Improving federal agency productivity enhancing capital investment programs. Rock Island, IL: U.S. Army Management Engineering Training Agency. Prepared for the office of Federal Management Policy, General Service Administration, June 1975.

Five federal agencies were surveyed concerning their capital investment emphasizing identification of opportunities, financing, evaluation, and implementation/post-implementation. A vast number of conclusions were developed. Guidelines are developed for productivity enhancing capital investment programs in Federal Agencies.

43 Cade, R. Air Force Logistics Command maintenance behavioral management pilot projects. LD 33942A. Wright-Patterson AFB, Ohio: Air Force Logistics Command, 1975.

This report compiles subjective and objective data on one year of Air Force Logistics Command (AFLC) maintenance experience with behavioral science pilot projects. Projects were implemented at six AFLC installations as part of an overall productivity improvement program. The report contains background information, analysis of indicators, amount of investments/benefits, lessons learned on each project, and observations on the entire pilot project effort. The author concludes that (1) the behavioral management projects have had some positive impact at all installations; (2) the amount of success seems to depend on the degree of management support of the concept; (3) no one strategy is applicable to all work environments; and (4) behavioral management strategies require a 3-5 year period to show truly tangible benefits.

44 Campbell, A. K. Testimony before the Senate Joint Economic Committee on Productivity, Waste and Fraud in the Federal Government, June 6, 1979.

Discusses the role of the Management Improvement Council and Federal Government Productivity Improvement. Cites as obstacle to improvement of productivity employee perceptions of productivity as "speed-up" and measurement issues. Specific measurement problems include: Changes in the input/output mix, taking into account both efficiency of producing outputs and the value of the outputs and separating intermediate from final outputs. Administrative problems relate to the facts: there are two managerial cultures (career civil servants and political appointees) each with some what different goals; budget disincentives; and centralized personnel regulations.

45 Campbell, A. The impact of civil service reform on productivity and motivation. In L. Broedling & R. Penn (Eds.), Military productivity and work motivation: Conference proceedings. NPRDC SR 78-15. San Diego, CA: Navy Personnel Research and Development Center, August 1978.

Reviews the impact of changes in the Civil Service system on productivity in Federal government agencies. With respect to productivity measurement, the author points out that the Joint Financial Management Improvement Program spent considerable effort developing a single all-purpose, all-encompassing index with little value to managers due to its generality. Recommends development of productivity measurement systems for use by agency managers at the work level. Suggests measures be developed at the lowest feasible working level or cost center.

46 Productivity Enhancement in Logistical Systems. Washington, DC: U.S. Department of Commerce, May 1975.

This manuscript presents the proceedings of a conference held in Dayton, Ohio, February 27-28, 1975, jointly sponsored by the U.S. Department of Commerce, the U.S. Air Force Logistics Command, and the National Commission on Productivity and Quality of Working Life. Topics covered by presentations included Human Resource Management, Productivity Enhancement, Organizational Development, and Productivity Measurement.

47 Improving federal agency efficiency through the use of productivity data in the budget process. FGMS D-78-33. Washington, DC: Comptroller General of the United States Report to the Congress, May 10, 1978.

Reports results from a survey of 13 labor intensive government agencies. The DOD was not included in the survey. Suggests that productivity data are available but not used. Congress creates disincentives to the use of productivity data in defense of a budget. Still a movement is underway to apply productivity data. The report describes five needs that must be met to properly make productivity data valuable information in the budget process. Of a particular interest was the comment that research is not quantifiable, thus not measurable in the sense of a productivity audit.

48 Output measurement in the United States Air Force, Washington, DC: Office of the Assistant Secretary of Defense (Comptroller), Defense Economic Analysis Council, Benefit/Output Determination Committee Report 3-74, May 1974.

Describes the USAF Cost Center Performance Measurement System. A DOD Instruction 7045.11 promulgated the concept of output information use in the Program Planning and Budgeting System (PPBS). As a result, acost centers were established. A cost center is defined as a unit where consumption of resources takes place. The report explains the procedure for combining output with unit cost and gives examples. It describes the status for implementing the system.

49 Ester, R. Relevant military research on productivity and motivation. In L. Broedling & R. Penn (Eds.), Military productivity and work motivation: Conference Proceedings. NPRDC SR 78-15. Navy Personnel Research and Development Center, August 1978.

Provides an overview of the DOD manpower research program and its implications for improving productivity in DOD. The author discusses and compares the definitions of productivity from the perspectives of an economist and a behavioral scientist.

50 Hodgson, J. D. Worker productivity key element in government and business. Defense Management Journal, 1972, 8 (3), 2-6.

The author, ex-secretary of Labor, presents his prescription for government productivity. It includes: (1) development of productivity yardsticks, (2) technological advances, (3) reorganization, revenue sharing, and reprivatization, (4) productivity bargaining, (5) development of "esprit de corps," (6) education of workers, and (7) equitable sharing of gains.

51 Joint Financial Management Improvement Program Report, Productivity programs in the federal government, Vol. I, productivity trends and current efforts. LD38749A. Washintgon, DC: July 1976.

Information on productivity trends is described for 279 organizational elements of 51 Federal departments and agencies. Trends are identified by three groupings: product oriented, service, and support. Of particular value are output measures used to measure the workload for functions within each group. For example, output measures for the function, loans and grants, under the "service" group include: grant applications received, program guaranteed loans approved, and proposals processed. Productivity measurement as a management tool is discussed. Lack of incentives to use these measurements in the Federal Government is discussed. Areas where measurements can be useful are summarized. A rather simplified "how to" explanation for conducting a Total Performance Measurement programs is provided.

52 Measuring and enhancing productivity in the federal government: Phase III Summary Report. Washington, DC: Office of Management and Budget, Civil Service Commission and General Accounting Office, June 1973.

Provides a historical perspective to the matter of measuring and enhancing productivity in the Federal Sector. The catalyst was a letter to the Comptroller General of the United States from Senator William Proxmire, dated September 21, 1970. Of specific value is insight into parameters which were considered useful and measurable, notes of caution concerning use of the data, and the identification of factors that have and will continue to cause changes in productivity. The report suggests that OMB should use productivity data in their manpower and budget planning. There is a lengthy discussion about the human resource influence on productivity with some time-independent conclusions.

53 Mark, J. A. Better federal coverage needed to improve national measurement. Defense Management Journal, 1972, 8 (3), 12-15.

This article notes the great need for comprehensive and detailed information on productivity changes in the national economy and in the government sector where there is no national measure of productivity. Also, there is no national measure of productivity that covers both private industry and government. The current yardstick of national productivity is based on the Bureau of Labor Statistics' concept of output per man hour, i.e., the real (price deflated) gross national product (GNP) originating in the private sector. According to the author, national productivity measures are seriously in error because activities "produced" by federal, state, and local government are not included.

54 Mark, J. A. Meanings and measures of productivity. Public Administration Review, 1972, 33 (6), 747-753.

The author, Assistant Commissioner for Productivity and Technology, Bureau of Labor Statistics, describes the significance and limitations of many currently used measures of national, sector, and industry productivity. He addresses labor, capital, and combined factor input productivity measures.

55 Mark, J. A. Concepts and measures of productivity. Bulletin No. 1714. U.S. Dept. of Labor, Bureau of Labor Statistics, Washington, DC: U.S. Government Printing office, September 1971, pp. 7-15.

The author, Assistant Commissioner for Productivity and Technology, Bureau of Labor Statistics, examines the shortcomings and inconsistencies present in the many measures of productivity currently in use. He addresses labor, capital, and combined input factor productivity measures at the industry, sector, and economy levels.

56 Morris, T. D., Corbett, W. H., & Usilaner, B. L. Productivity measures in the federal government. Public Administration Review, 1972, 32 (6), 753-763.

A detailed historical synopsis of the evolution of productivity measurement in the federal sector from the early 1960's to fiscal year 1973, noting the increasingly integrative roles of the Bureau of Budget, General Accounting Office, Civil Service Commission, Department of Labor, and Office of Management and Budget. Staff researchers initiate a comprehensive effort to determine the extent of productivity measurement in 17 federal agencies and departments covering nearly 1.6 million federal civilian personnel. Functional indices of productivity for 605 individual outputs were developed on a per man-year basis. An overall index of federal sector productivity revealed an increase of 7.7 percent--or an average annual rate of 1.9 percent--between fiscal year 1967 and 1971. The productivity data were further disaggregated by calculating productivity trends by major functional service area (public, support, industrial). Uses and abuses of productivity indices are noted along with a call for more research into quality-quantity relationships and the lessons of private industry's success with participative/ enrichment programs as methods of motivating productivity improvement.

57 Poulos, P. G. Challenging DOD managers to improve internal productivity. Defense Management Journal, April 1977, pp. 34-40.

In this article the author presents a general conceptual scheme for the factors affecting productivity change and then describes the DOD productivity program's efforts to address these factors. The program has three parts - productivity measurement, productivity enhancement and productivity evaluation. Within the enhancement area, the DOD program has four basic thrusts: Capital investments, methods analysis, work measurement, and personnel motivation. Each of them is discussed briefly, providing an overview of the DOD productivity program; however, the exact meaning of productivity measurement in the DOD program is somewhat vague.

58 Power, R. J. Productivity: A Defense Department perspective. Defense Management Journal, April 1977, pp. 2-8.

In this article the author provides a useful overview of the productivity challenge facing the Department of Defense and some of the program initiatives underway to meet this challenge. For the reader interested in the productivity "big picture," this article will be valuable. It also provides a useful and brief summary of the history of DOD productivity initiatives dating back to the early 1900's.

59 Sugarman, J. M. Statement before House Committee on Post Office and Civil Service Subcommittee on Civil Service, June 14, 1979.

Discusses the structure and functions of the Productivity Program that is being initiated by Office of Personnel Management. Principal organizational components include research and program development, consultant services, technical and training assistance, measurement and analysis. Measurement programs will be targeted to be relevant to operating managers. This will supplement but not replace aggregate measurement systems which are global in scope and of value primarily to top management. Measurement for operating managers will concern efficiency based measures for program operations and common administrative services.

60 Terleckyi, N. E. Productivity analysis, tempered with judgement, improves efficiency. Defense Management Journal, October 1972, pp. 25-28.

The author, Director of Goals Accounting Studies for the National Planning Association, notes that there are many ways to formulate concepts of governmental outputs and inputs in an effort to measure productivity. While productivity is generally based on an output-input ratio, it can be measured on three distinct levels: (1) managerial efficiency, (2) program efficiency, and (3) policy effectiveness. The importance of judgement and the difficulties of measurement are greater when involving major government policies. In evaluating the normative significance of measured productivity changes, consideration should be given to the desirability of productivity gains and whether program managers/decision makers, are to receive credit for the productivity changes.

1.4. Organizational Effectiveness Theory

61 Friedman, A., & Goodman, P. Wage inequity, self-qualifications, and productivity. Organizational Behavior and Human Performance, 1967, 2 (4), 406-417.

This article refines and qualifies the work done by Adams, which showed that persons paid by the hour will produce more if they perceive they are being paid "too much." By examining some intervening variables such as (1) dissonance between experimenter's and subject's perceptions of subject's qualifications, and (2) task difficulty, the experimenters weakened Adams' conclusions. This is a theoretical and technical article reporting findings of some practical significance.

62 Gilbert, T. F. Human competence. New York: McGraw-Hill, 1978.

Provides a comprehensive theoretical approach to the problem of engineering worthy performance in organizations. In a unique and clearly described presentation, the author attempts to integrate literature and approaches from the behavioral sciences and engineering to develop a model of human competence. The book includes sections on measuring human competence, a system for conducting performance audits, and approaches to engineering human competence that range from education to motivation. It contains a large number of examples abstracted from the author's consulting and teaching experience. The book provides readers a very practical and logically appealing framework to think about performance in organizations. It also contains illustrations of the "tools" necessary to implement the theory.

63 Goodman, P., & Pennings, J. Toward a framework of organizational effectiveness. AD-A029 327. Pittsburgh, PA: Carnegie Mellon University, 1976.

This report reviews five original essays on the theory of organizational effectiveness presented at a Navy funded workshop at Carnegie-Mellon University. The essays provide a view of the substantive issues associated with the development of an integrated theory to guide organizational effectiveness research.

64 Herschauer, J. Optimal incentive standards: Are they possible? Industrial Engineering, 1971, 3 (1), 30-32.

The author discusses a theoretical methodology for construction of optimal incentive standards. The technique calls for a worker-output response (to standards) curve, which is not now known. The author concludes that more knowledge about worker response to standards and incentives is needed before optimal incentive standards can be designed.

65 Mahoney, T., & Frost, P.J. The role of technology in models of organizational effectiveness. Organizational Behavior and Human Performance, 1974, 11 (1), pp. 122-138.

Tests the hypothesis that criteria of organizational effectiveness vary as a function of the dominant technology of the organizational unit. Results from 297 organizational units classified as either long-linked (manufacturing oriented, clear input output links), mediating (some discretion required in linking processing variable inputs), or intensive (considerable discretionary activity) support this hypothesis.

66 Mahoney, T., & Weitzel, W. Managerial models of organizational effectiveness. Administrative Science Quarterly, 1969, 14, 357-365.

The authors report the results of a factor analysis of managers' ratings of 114 criteria of organizational effectiveness for 283 organizational units. Twenty-four independent factors emerged, accounting for 64 percent of the variance among organizations. A second analysis used the factor scores for 24 dimensions in a regression analysis to predict ratings of overall effectiveness of the organizational units. This analysis accounted for 58 percent of the variance in ultimate effectiveness. The final regression model included four predictors of effectiveness: (1) productivity-support-utilization, (2) planning, (3) reliability, and (4) initiative. Based on these analyses, the authors develop a conceptual model of organizational effectiveness.

67 Schwab, P., & Cummings, L. L. A theoretical analysis of the impact of task scope on employee performance. Academy of Management Review, 1976, 1 (April), 23-35.

A model is proposed linking task scope to employee motivation and performance. Task scope is defined as including both the vertical (enrichment) and horizontal (enlargement) dimensions of the responsibilities and/or activities within a task. In the model, which is an expectancy model of motivation, task scope is an intervening variable. The model attempts to explain the results of changes in task scope on instrumentalities, expectancies, and valences and ultimately on performance.

68 Shiflett, S. Toward a general model of small group productivity. Psychological Bulletin, 1979, 86 (1), 67-79.

Discusses a mathematical model for describing the parameters affecting productivity in small work groups. This theoretical paper provides some conceptual tools for thinking about ways in which small groups differ in terms of three general classes of variables: resources - knowledge, abilities, skills or tools possessed by the worker; transformers - variables that affect the way in which resources are transformed into products; and outputs which are the results of group interaction. The author attempts to demonstrate ability of the model for understanding leadership and social decision making.

69 Turney, J. R., & Cohen, S. L. Organizational implications for practicing OD in the Army. Personnel Psychology, 1978, 31, 731-738.

Organizational development (OD) techniques have been used in the Army on a limited experimental basis for the past six years. Since OD consists of a "planned, long-range, systems level, behavioral science based program of improvement," the authors stress that OD effectiveness is influenced greatly by the identification and integration of all salient organizational characteristics into OD program design and measures of effectiveness. Six such characteristics are identified for military organizations--organizational structure, total immersion environment (24-hour job) personnel rotation, personnel reductions, military-civilian dichotomy, and organizational objectives of military units.

1.5. Employee Attitudes and Productivity

70 Brayfield, A. H., & Crockett, W. H. Employee attitudes and employee performance. Psychological Bulletin, 1955, 52 (5), 396-424.

In this classic article, the authors present an analysis of the research literature that provided a basis for reorienting the field of research relating attitudes to performance. The authors suggest that the idea of a cause and effect relationship between satisfaction and performance (e.g., happy workers are productive workers) is overly simplistic. They suggest instead that satisfaction and productivity co-vary, in that people are motivated to achieve certain goals and goal achievement leads to satisfaction. The authors also provide an insightful critique of performance criterion measures which appeared in the literature. Most "hard criteria" suffered from various dificiencies e.g. relevance, reliability, freedom from contamination and practicality. As a result more investigators used ratings of performance which were equally flawed.

71 Jones, D. An analysis of the relationship between job satisfaction and labor productivity as measured across line items within an organization. AFIT-GSM-SM-775-6, AD-A045 983. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1977.

This thesis analyzes the relationship between job satisfaction and productivity across an aerospace organization located at Newark AFS, Ohio. Production data in the form of units produced, direct labor hours, and direct material costs (in 1967 dollars) were used. The production data used covered 20 line items that are repaired at Newark AFS. Through the use of regression techniques, marginal products were determined. These marginal products were used with job satisfaction responses obtained by use of a questionnaire to study relationships between job satisfaction and productivity, as measured at Newark AFS.

72 Martin, A. R. Morale and productivity: A review of the literature. Public Personnel Review, 1969, 30 (1), 42-45.

This review article written 15 years after the classic article by Brayfield and Crockett did not refer to the earlier work but came to the same conclusion - that there is no consistent positive relationship between satisfaction and productivity.

1.6. Quality of Working Life Overview

73 Harman, S. Worker productivity: Technology or People? Personnel Journal, 1979, 58 (4), 209-211; 253-254.

A former Chief Executive Officer who instituted a comprehensive quality of working life program talks about his experiences in industry and as an Under Secretary of Commerce. In an interview style article, Dr. Harman shares his philosophy regarding the need for and benefits of increased democratization of the workplace.

74 Mills, T. Human resources - why the new concern? Harvard Business Review, 1975, 53 (2), 120-134.

The author attempts to analyze the forces which are acting to increase organizational interest in the field. It presents not only the management view but also some of the suspicions of organized labor which have caused its lukewarm acceptance of the approaches. This is a useful background article for someone interested in a broad philosophical view of "why worry about the human resources revolution."

2. Productivity and Quality of Working Life Improvement

2.1. Employee Participation

75 Participative management at work. An interview with John F. Donnelly. Harvard Business Review, 1977, 55 (1), 117-127.

The mirror company described has implemented many innovative participative management techniques. The interview with the president of the company addresses many of these programs including: interwoven work teams, the committee to handle morale, grievance, promotion, and compensation issues, and the Scanlon Plan and the company's adaptation to the Plan. Employees have considerable control over the company's operation. The president discusses industrial authority and democracy in the workplace. He discusses the role of middle and upper managers. There is no discussion of problems encountered in institutionalizing the system. There is no discussion of productivity measurement procedures.

76 Folloni, J. R. Production certifies quality of its work. Industrial Engineering, November 1971, pp. 12-17.

The Director of the Quality Management Division, Quonset Point Naval Air Rework Facility (NARF), Rhode Island, summarizes the rationale evolution, challenges, and positive productivity improvements resulting from their certification program for rework operations (repairs) on aircraft weapons systems and related equipment. Following 12 years of poor quality control and lack of cooperation between the Production and Quality Departments, a new production quality certification effort was initiated in 1976 based on the integrative concepts of cooperative group effort, selling the entire organization of about 3000 persons on the idea, and permitting all groups (including quality and production unions) to participate in the planning, implementation, and monitoring of the quality certification program.

77 Marrow, A. J. The effect of participation on performance: In A. J. Marrow, The failure of success. New York: AMACOM, not dated.

Discusses the impact of worker participation during the introduction of new technology. Special emphasis is on performance and acceptance of the technology. The experiment was carried out in a rural Virginia manufacturing firm. Productivity, in units per hour, for the participative group exceeded that of the non-participative group. The non-participative group when allowed to participate on a subsequent "innovation decision" showed similar positive results.

78 Myers, D. W. A quantitative analysis of employee creativity. Personnel Journal, 1969, 48 (11), 873-877.

An examination of the relationship between creativity and job performance for two comparative samples of 29 creative employees and 29 randomly selected employees among the 5600 employee population of the Atlanta Post Office, an organization that has received several coveted awards for cost savings generated by its suggestion system. A chi-square test revealed a relationship between employees who received excellent ratings from their superiors and the presence of creativity in that same individual. Ten steps in a superior suggestion system are discussed - setting goals, regular progress reports, controlling the suggestion system, using rotating committees, open-door policy, prompt handling of suggestion ideas, auditing the system annually, top management support and union participation.

79 Quick, J. H. Measuring Office Productivity. The Office, 1972, 76 (6), 12-22.

The author is a management consultant who describes his approach to white collar productivity improvement. It includes involving the worker, broadening jobs, and setting time goals for standard work sequences.

80 Rieker, W. S. Illustrated introduction to Quality Control Circles. Unpublished manuscript, W.S. Rieker Inc., 1977.

Very general introduction to the operation of a quality circles program describing some of its basic purposes and methods.

81 Roche, W. J., & MacKinnon, N. L. Motivating people with meaningful work. Harvard Business Review, 1970, 48 (3), 97-110.

The authors explain one company's formula for making production work "meaningful." This formula uses regular supervisor-worker meetings to set goals, identify production problems, and involve workers in solving them. The article includes many anecdotes illustrating the positive and (occasional) negative results. The authors list actions to be taken by the training team, by the group itself and jointly with either management or supervisors, to improve chances of success. There is also a list of ingredients for failure.

2.2. Gain Sharing

82 Donnelly, J. F. Increasing productivity by involving people in their total job. Personnel Administration, 1971, 34 (5), 8-13.

An advocacy piece extolling the benefits of behavioral science for a manufacturing firm. The author, president of the firm, has experimented with a variety of approaches including Blake's Managerial Grid, Likert's System IV, and the Scanlon Plan. While excellent results are reported (e.g. doubling growth rate, doubling rate of return on investment and offering highest pay in the area to his workers) no data are offered to show why these results occurred or if in fact they were caused by the program.

83 Frost, C. V., Wakeley, J. H., & Ruh, R. A. The Scanlon Plan for organization development: Identity, participation and equity. East Lansing, MI: Michigan State University Press, 1974.

Incentive schemes are widely proposed as a productivity enhancement mechanism. This book describes the mechanics of a group incentive plan - the Scanlon Plan and reviews research results regarding its effectiveness. The plan is based on two principal assumptions. First it assumes that if productivity is to be improved, something must change a that wide organizational participation is desirable for deciding on and implementing change. Secondly, the plan assumes that people should be fairly rewarded for their contributions to the organization. This is carried out through a bonus paid to employees when performance of the organization improves. Research on the effectiveness of Scanlon Plans has been sketchy and the conclusions seem ambiguous. In some cases the plan has led to quantitative increases and in other cases the plan was abandoned. A consistent finding is the positive impact of participative decision making on employee attitudes.

84 Iman, S. The development of participation by semi-autonomous work teams: The case of Donnelly Mirrors. In L. Davis & A. Cherns, The quality of working life Vol. II. New York: The Free Press 1975, 216-231.

Discusses the organizational development program at a manufacturing firm. Introduction of semi-autonomous work teams along with a change from hourly pay to salaries and introduction of a version of the Scanlon Plan led to dramatic improvements in productivity of 48% over a two year period. In addition quality rose from 92 to 98.8% and absenteeism dropped from 5 to 2 percent.

85 Moore, B. E., & Ross, T. L. The Scanlon way to improved productivity: A practical guide. New York: John Wiley & Sons, 1978.

In this book the authors provide a very comprehensive and systematic treatment of the Scanlon plan. Because it is well documented and filled with practical suggestions, the book comes as close to a do-it-yourself guide as is possible considering the topic. The authors guide the reader through a consideration of what the Scanlon plan is, how to determine if it is appropriate for your organization, preparation for implementation, implementation and evaluation strategies. Appendices supplement the text by providing copies of diagnostic and evaluation questionnaires, sample memos, minutes and suggestion forms. In applying the concept of productivity measurement in Scanlon plan implementation the authors distinguish between performance productivity -- output per man-hour from financial productivity -- ratio of labor cost to sales value. They propose the latter as the most useful approach for Scanlon plan companies. The authors report 44 examples of Scanlon plan implementation. Although the benefits and bonus payouts varied, 20 of these were considered successful.

86 Puckett, E. S. Productivity achievements: A measure of success. In R. Sutermeister, People and productivity, New York: McGraw-Hill, 1963.

Discusses the experiences of 10 organizations with the Scanlon Plan -- a group gain-sharing program which ties employee bonuses to organizational performance. In the 10 organizations described, productivity increases ranged in the first year from 6.8% to 38.7% (average 22.5) and in the second year, from 10.0% to 49.4% (average 23.7). Provides little information as to the details associated with the organizations or the mechanics of the plan.

87 Ross, T. L., & Jones, G. M. An approach to increased productivity: The Scanlon Plan. Financial Executive, 1972, XL (2), 23-29.

This article provides a description of the basic tenets of a Scanlon Plan - a group gain sharing approach where productivity improvements lead to direct financial return to employees. The plan is based on three principles (1) that major participation by workers is essential at all organizational levels, (2) much of the productivity gain is to be paid to participants on a regular basis, and (3) the plan should be implemented in the context of a collective bargaining agreement if the firm is unionized. One major factor influencing its success or failure is the formula for measuring productivity. The formulas used vary from plan to plan but it must be understandable to members in order to be successful. Usually labor productivity is measured, e.g., ratio of payroll costs to sales value of production.

88 Sherman, G. The Scanlon concept: Its capabilities for productivity improvement. Personnel Administration, July 1976,

The vice president of industrial relations and personnel administration for a large corporation, presents his laudatory views and recommendations for utilizing the Scanlon concept to enhance productivity. In imploring U.S. industry to reassert the initiative to "salvage our free enterprise systems," he stresses that U.S. industry should learn from the Japanese experience which combines rational management with duty and humanism to promote a sharing, productive relationship in the workplace. The author summarized the details of the successful implementation of the Scanlon concept at a Tennessee electrical products plant. Labor efficiency improved nearly 10 percent, a $250,000 plant capacity expansion was obviated, people savings (new hires avoided) of 12 percent of the workforce occurred, grievances were cut in half, absenteeism went down from 5.6 to 2.8 percent, and turnover dropped from a 1973 high of 35.8 to a 1975 low of 2.6 percent.

2.3. Incentive and Positive Reinforcement Programs

89 Adam, E. E., Jr. Behavior modification in quality control. Academy of Management Journal, 1975, 18 (4), 662-679.

Quality and quantity of performance in a diecasting operation were investigated as a result of both attitude change and behavior modification procedures. A variety of "zero defects" type attitude change materials were used along with weekly performance feedback by supervisors. The participants were 41 workers in diecasting and a control group consisting of 23 production machine operators. The results showed no attitude changes between the experimental and control groups and no quality changes in the experimental group over time. However, there was a significant improvement in performance quantity which meant a real cost reduction per week of $1,543 or over $77,000 per year. This result was apparently due to the behavior modification program with supervisory feedback as the reinforcer.

90 Bretton, G. E., Dockstader, S. L., Nebeker, D. M., & Shumate, E. C. A performance-contingent reward system that uses economic incentives: Preliminary cost-effectiveness analysis. NPRDC TR-78-13. San Diego, CA: Navy Personnel Research and Development Center, February 1978.

This report describes an evaluation of the Navy's experimental program to improve the productivity of civil service data transcribers through the use of economic incentives. The evaluation was conducted from the following perspectives: (1) cost effectiveness of the performance contingent reward system (PCRS) compared to former production conditions at the test site, (2) issues relative to the generalizability of the test site results to other Navy organizations, and (3) projections of the PCRS-induced cost savings in terms of specified outyears, levels of aggregation of data transcribers and levels of generalizability of test site results. The approach described is a useful methodological model for cost-effectiveness evaluation of other productivity improvement programs.

91 Wage incentives still deserve a try. Business Week, September 9, 1972, pp. 110C-110F.

An article discussing the status of individual incentive programs in industry. There is considerable controversy over the effectiveness of such schemes and a belief that such systems are becoming less popular. The article summarizes some of the claimed benefits (e.g. productivity improvements) and some of the problems (e.g. morale problems for workers not covered, need to keep standards current, difficulty of abandoning system if it doesn't work well). A conclusion is that an atmosphere of trust between labor and management is a prerequisite for success.

92 Duerr, E. C. The effect of misdirected incentives on employee behavior. Personnel Journal, 1974, 53 (12), 890-897.

In its efforts to attain organization goals and control/evaluate employees, management may unfortunately permit misdirected incentives to inhibit human performance. Any incentive is misdirected that causes people to act in a manner directly opposite from the way in which the organization wants them to act and can lead to poor performance and personnel conflict. Since reporting system goals can easily be in conflict with broader organizational objectives, a manager must avoid preoccupation with what is being measured and reported -- e.g., "unit production cost", number of people supervised, size of budget, number of decisions made by key manager's, etc. Several suggestions are given to help reduce misdirected incentives with particular emphasis on the validity of the measurement system, the reward system and the manager's own operating characteristics.

93 Does the Federal Incentive Awards Program Improve Productivity? FGMSD-79-91 Washington, DC: General Accounting Office, March 1979.

The Government Accounting Office (GAO) concludes that the incentive system employed by most government agencies has not reached its full potential in improving productivity. Reasons for this are cited along with recommendations for correcting this situation. The suggestions are bureaucratic in nature and do not address internal agency need for productivity measurement and audit. The GAO recognizes the incentive awards program as a management tool which requires strong and effective management if it is to be successful.

94 Hayes, J., Spector, B., & Fain, J. Incentive management--stimulating worker productivity through rewards-for-performance. Contract No. MDA903-79-C- 0009. Arlington, VA: Consolidated Analysis Centers, Inc. 1979.

This interim technical report defines and identifies incentive management (rewards-for-performance) strategies that have been and can be employed to stimulate worker productivity. Recent theoretical and empirical studies are reviewed to evaluate the relative effectiveness of alternate incentive plans on performance. An inventory of popular incentive systems is compiled and a taxonomy that classifies incentives is designed. Finally, a computer based demonstration package is developed to display how workforce supervisors and organizational development specialists can tailor incentive designs to the needs of specific organizations and job functions. The preliminary results indicate that incentive management is an effective tool to improve worker productivity and maximize manpower cost savings. However, tailored incentive strategies are required to meet the special contingencies of different organizations and tasks. The authors conclude that incentive management is an effective tool by which workforce supervisors can increase motivation, improve productivity and quality, and yield substantial payoff in terms of manpower cost savings. However, different incentive strategies are required to meet the special contingencies of different organizations and job functions.

95 Jehring, J. J. The effects on productivity of dropping individual incentives: A case study. Personnel Journal, 1966, 45 (2), 87-89.

A company dropped its individual incentive plan for a group of transcribers after its use over an extended period did not seem to improve productivity. A company-wide profit-sharing plan remained in effect during the entire period. When the individual plan was dropped, production went down for the best workers and up for the least productive workers. Total group production did not change significantly, while individual performance approached the group norm.

96 Latham, G. P. &, Locke, E. A. Goal setting: A motivational technique that works. Organizational Dynamics, December 1979.

Describes a number of field studies to support goal setting as a sound method for improving performance. The first case described differences of management style among logging supervisors. Evidence showed that specific production goals combined with "supervisor presence" to ensure goal commitment led to a significant increase in productivity. Further case studies conducted in the pulp wood industry showed similar results. The authors discuss the effects of participation vs. non-participation in goal setting, union involvement, and educational level. The report concludes with a procedure for goal setting. The characteristics of methods for getting necessary support in using the method and possible resistance to goals are described.

97 Locke, E. A., Feron, D. B., McCaleb, V. M., Shaw, K. N., & Denny, A. T. The relative effectiveness of four methods of motivating employee performance, Presented to NATO International Conference on Changes in the Nature and Quality of Working Life, Thessalonika, Greece, August 1979.

Provides a comparison of four methods for motivating work performance: money, goal setting, participation, and job enrichment. A review of 56 studies which measured performance using hard criteria found medium performance improvements with the four approaches: money 30%, job enrichment 17%, goal setting 16%, and participation .5%. It was found that money incentives (piece rate plan) combined with goal setting had the highest median performance improvement of 40%. While generalizations made across diverse studies and organizational settings are tenuous, this study illustrates the range of performance improvements possible using behavioral methods.

98 Oldham, G. R. The motivational strategies used by supervisors: Relationships to effectiveness indicators. Organizational Behavior and Human Performance, 1976, 15 (1), 66-86.

In this excellent and very practical piece of research, the author lists nine strategies which might be used by supervisors to improve employee motivation and performance. Using interviews and questionnaires he then attempts to show which of these strategies correlate with organization effectiveness measures. Five of the strategies are shown to correlate positively with success at motivating employees. The supervisors who use the five techniques are often rated as having very productive subordinates. One technique correlated highly with negative ratings on both effectiveness measures.

99 Schneir, C. E., Pernick, R., & Bryant, D. E. Improving performance in the public sector through behavior modification and positive reinforcement. Public Personnel Management, March-April 1977.

Working in a payroll and travel section of a Federal government agency, the authors demonstrate the application of positive reinforcement methods to improve work output. By defining desired outputs, training supervisors in the application of positive reinforcement techniques, setting performance standards, and providing regular feedback to workers, performance was improved on all target behaviors. Of six criteria defined for the payroll unit (22 full-time and three part-time clerks) all improved at least 77% with an average improvement of 92%. Of five criteria defined for the travel unit (six employees), performance improved by 61% or more on all five or an average 78%. Dollar savings on an annual basis were reported to be $112,000 for the payroll section of $35,000 for the travel section. The authors acknowlege that some of these gains are probably "Hawthorne effects" but feel that most are due to breaking the jobs down into sub units, setting standards, providing feedback and improved work scheduling.

100 Schneir, C. E., & Pernick, R. Increasing public sector productivity through organization behavior modification: A successful application, Paper presented to the Academy of Management National Meeting, Atlanta, Georgia, 1979.

Working in the personnel processing section of a Federal agency, the authors describe a successful application of behavior modification techniques to improve performance. The section included 10 clerks administratively supporting personnel actions for an agency of 5100 people. The intervention consisted of supervisory training in principles of performance analysis, feedback design and consequence management coupled with identification of major outputs, developing work standards and a feedback system. Of the 11 performance measures chosen, performance improved on nine and ranged from 40% to 386%. Improvements averaged 109%. Other changes reported were reduction in overtime, development of work schedules and development of a task-oriented climate which has enhanced the unit's image within the agency.

101 Shumate, E. C., Dockstader, S. J., & Nebeker, D. M. Performance contingent reward system: A field study of effects on worker productivity. NPRDC-TR-78-20. San Diego, CA: Navy Personnel Research and Development Center, 1978.

Describes the development and test of an individual incentive system for Navy civilian data entry operators. Production standards were developed and the performance contingent reward system paid monetary bonuses for performance above standard. Cost-effectiveness analysis showed that program costs were recouped in 3 months. Productivity is measured by key strokes per hour.

102 Spector, B. & Hayes, J. Productivity improvement through incentive management: Progress toward developing a new management resource. Contract No. MDA 903-79-C-009. Arlington, VA: Consolidated Analysis Center, Inc., 1979.

This final technical report defines and identifies incentive management (rewards-for-performance) strategies that have been and can be employed to stimulate worker productivity. Recent theoretical and empirical studies are reviewed to evaluate the relative effectiveness on performance. An inventory of popular incentive systems is compiled and a taxonomy that classifies incentives is designed. A case study of a large-scale productivity improvement effort at a major U.S. Army depot is presented. Finally, a computer-based management aid is designed and a demonstration package developed to display how workforce supervisors, organizational development specialists, and key installation management personnel can tailor incentive plans to the specific needs of varied organizations and job functions. Results indicate that incentive management strategies are effective tools to improve worker productivity and maximize manpower cost savings but specific tailored plans are required to meet special contingencies of different organizations and tasks.

2.4. Job Redesign/Job Enrichment

103 Beer, M., & Huse, E. Improving organizational effectiveness through planned change & development. In H. Meltzer & F. R. Wickert (Eds.), Humanizing Organizational Behavior. Springfield, IL: Charles C. Thomas, 1976.

Described a number of organizational innovations in a plant which manufactures instruments for medical and laboratory use. Reports results of job enrichment efforts which led to a 47% increase in productivity, a drop in rejects and increased employee satisfaction. Other job enrichment efforts led to more mixed results although generally positive efforts on absenteeism, productivity and quality.

104 ICI breaks its bottleneck. Business Week, September 9, 1972, p. 119.

A British firm has virtually eliminated production supervisors by vertically loading production workers' jobs. The breakeven point a productivity increase of 15%, should be reached when the business cycle swings upward. At present, gains of 11% in productivity have been made. Without the program the company's profits would have fallen even further than the 6.5% drop experienced.

105 Cox, J. Evaluation of orthodox job enrichment (OJE) results in AFLC. PMC 77-2, Ft. Belvoir, VA: Defense Systems Management College, 1977.

This report involves an independent analysis of one of the orthodox job enrichment (OJE) pilot projects implemented at the Ogden Air Logistics Center, Air Force Logistics Command. The purpose of this study was to conduct an objective evaluation of the data within the context of the depot maintenance environment. The study is important because increasing pressure to reduce budgets and still maintain an effective defense capability requires managers to accomplish greater productivity with fewer resources. To meet this challenge, several theories have been offered to increase worker productivity. Herzberg's OJE approach was adopted by the Ogden Air Logistics Center and 11 pilot projects were conducted to test it. Early successes with OJE led management to expand the program at the Ogden Air Logistics Center and Air Force Logistics Command has adopted it for implementation throughout the command.

106 Davis, L. E. Job design and productivity. In R. Sutermeister People and productivity. New York: McGraw-Hill, 1963.

Discusses three experiments which test alternatives to the traditional views of job design which emphasize specialization, repetition, and minimal skill requirements. Experimental studies show that alternative methods may be inferior in terms of the narrow criterion of output per work-hour or cost per unit of output (narrowly defined). They are superior in terms of total economic costs which include quality of output and other social measures (e.g., absenteeism, turnover, labor-management relations).

107 Dettelback, W. W., & Kraft, P. Organization change through job enrichment. Training and Development Journal, 1971, 25 (8), 2-6.

The article discusses a trust company that experienced morale, turnover and absenteeism problems among the clerks in the stock transfer department, which included over 200 employees. Management designed work modules and enlarged the job vertically. That is, they gave the clerks more responsibility for work scheduling, checking, and record-keeping. Productivity went up 100% along with morale. The success of this experiment has encouraged more job redesign projects throughout the company.

108 Ford, R. N. Job enrichment lessons from AT&T. Harvard Business Review, 1973, 51 (1), 96-106.

A pioneer in the job enrichment process discusses examples of job enrichment experiences at the company. He first covers the basic ingredients of the process then gives specific examples. The benefits of job enrichment vary. In one example, however, service representatives and clerical staff increased work load 21% without increasing staff, issued 90% of the orders on time compared to 27% before the experiment and improved service order accuracy. In a similar unit in another area when typists were given a regular group of people to service, their rate of producing service orders increased by 1/3, absenteeism dropped to .6% compared to 2.5% for a comparison group and errors per 100 orders dropped to 2.9 vs. 4.6 in the comparison group. The author concludes by summarizing the lessons learned in this experience with job enrichment.

109 Ford, R. N. Why jobs die and what to do about it. New York: AMACOM, 1979.

The author, one of the foremost practitioners of job redesign techniques, presents his views of this art. The book is organized into two parts. Part one provides a manager with an approach to determining why jobs go sour, how to recognize "bad" jobs, how to redesign old jobs or create new jobs to build in motivational principles and how to meaningfully organize jobs into groupings. Part two encourages readers to focus on their own jobs, to analyze them, and to take certain actions to improve them. Highlights of this book include the author's 10 reasons why jobs die and his 22 principles for redesigning jobs for improved motivation.

110 Greenblatt, A. D. Maximizing productivity through job enrichment. Personnel, 1973, 50 (2), 31-39.

The author discusses the steps required to introduce job enrichment and uses the keypunch to illustrate the process. The linkage between job enrichment and productivity is apparently accepted on faith as the author presents no data nor references to other sources. Productivity is not defined; however, in the keypunch example it is apparently equated with "production."

111 Gomberg, W. Job satisfaction: Sorting out the nonsense. The American Federationist, 1973, 80 (6), 14-19.

The author provides a reinterpretation of the data published in an HEW sponsored project entitled Work in America. Taking labor's point of view and writing as an industrial engineer, the author attacks the "behavioral evangelists" who see job enrichment as an all-encompassing panacea. He feels that there is a danger in the redesign of work efforts that we will have happy workers producing for customers who will be priced out of the market. The point of view expressed here is interesting for those who might be advocating job enhancement and job redesign as a productivity enhancement tool. Nevertheless the author feels that the basic idea of worker participation in decision making is sound and will contribute to improved satisfaction and productivity.

112 Jacobs, C. Job enrichment of field technical representatives -- Xerox Corporation. In C. Taylor & A. Cherns (Eds.), The quality of working life Vol. II. New York: The Free Press, 1975, pp. 105-118.

Discusses a project to "enrich" jobs of field technical representatives in a large corporation. The project was evaluated using a combination of attitudinal and performance measures. Enrichment led to an increase in positive attitudes compared to a control organization. Absenteeism decreased by 40% and performance indicators (e.g., cost of parts and overtime) improved.

113 Janson, R. A job enrichment trial in data processing - in an insurance organization. In C. Davis & A. Cherns (Eds.), The quality of working life Vol. II. New York: The Free Press, 1975.

Describes a job enrichment project in an insurance company's data processing department. The target job was keypunch operators (N=75) with a control group that was slightly larger. Employees were given increased autonomy, accountability to specific clients and more responsibility. These changes led to improved performances on hard criteria (e.g., dollar saving and errors, absenteeism) and improved attitudes. The project was expanded to larger groups of employees in the organization.

114 Kemp, R., & Prather, J. An experimental design to evaluate the effects of job enrichment and goal setting on satisfaction and productivity. LSSR 22-778, AD A047 437. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1977.

The purpose of this research effort was to design a field experiment to test the effects of job enrichment and goal setting on worker satisfaction and productivity in a large Department of Defense organization. Individual demographic data and pretest survey results were obtained from the organization which was to participate in the experiment. This research includes (1) the plan for the overall experiment; (2) a discussion of the threats to validity that must be considered in the experiment; and (3) procedures, criteria, and recommendations for the selection of specific sections to participate in the experiment.

115 Kempner, T., & Wild, R. Job design and productivity. Journal of Management Studies, 1973, 10 (1), 62-81.

This article reports a series of studies carried out among unskilled workers in England. Many useful findings are reported. Overall the researchers find that job redesign would improve the morale and tenure of some but not all workers and does not result in significant productivity gains if applied across the board. Workers who are dissatisfied show certain common characteristics and tend to be most unhappy with the nature of the work itself. A least-cost remedy for turn-over related to this dissatisfaction is to put those likely to be dissatisfied into redesigned jobs.

116 Lachenmeyer, C. Measuring labor related productivity. Managerial Planning, 1977, 25 (6), 38-40.

The author lists questions to assist in productivity analysis and work design. The approach examines the definition of productivity and considers ways in which work design can assist organizations achieve productivity improvements.

117 Luthans, F., & Knod, E. Critical factors in job enrichment. Atlanta Economic Review, 1974, 24 (3), 6-11.

The authors argue that usefulness of job enrichment (JE) is unrelated to the correctness of its theoretical roots (Herzberg's motivators and hygiene factors). Instead, success of JE is related to specific situational factors, which the authors identify as: job factors (level, autonomy, control, and feedback), employee factors (skill, values, and motives), and organizational factors (support, costs, and evaluation). This is a clear, useful article which bridges the gap between theory and practice.

118 Maher, J. R. (Ed.). New perspectives in job enrichment. New York: Van Nostrand Reinhold Co., 1971.

Eleven chapters by various authors discuss job enrichment case studies and considerations in conducting job enrichment programs. Jobs discussed include janitorial, quality control inspection, typists, audit clerks, and engineers. Most of the case studies report quantitative outcome measures, such as judged percentage of cleaning standard obtained by janitors, and percentage of rejects found during assembly for quality control inspectors.

119 Maher, J. R. (Ed.). New perspectives in job enrichment. New York: Van Nostrand Reinhold Co., 1971.

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119 Patton, J. V. Job enrichment within the Air Force. Report No. 1825-79, Maxwell AFB, AL: Air Command and Staff College, Air University, April 1979.

A student research report compares the two types of job enrichment programs in use by the Air Force today. The orthodox job enrichment Program (Herzberg), begun in 1974 at Ogden Air Logistics Center (ALC), Hill AFB, UT, is now used exclusively at other ALCs. The Hackman and Oldham job enrichment technique (job surveys and worker participation in job redesign) was tested initially in 1976 at Ellsworth and Seymour-Johnson AFBs and is now used throughout the rest of the Air Force, except for the AFLC. The author concludes that both programs are working successfully and may subject the Air Force to criticism for using two different job enrichment approaches.

120 Suojanen, W., McDonald, M., Swallow, G., & Suojanen, W. (Eds.). Perspectives on job enrichment and productivity. Atlanta, GA: Georgia State University, 1975.

A set of 20 readings on the theory, practice, and application of job enrichment. Includes readings representing both advocates of the concept as well as critics from union and the industrial engineering communities.

2.5. Labor Management Cooperation

121 Abel, I. W. Steelworkers union and industry join hands to improve productivity. Defense Management Journal, October 1972, pp. 21-24.

The author describes a union and management program for working together in the steel industry to improve productivity and job security for steel workers. For labor people who equate productivity with "work harder," the author counters that it means "think smarter." This is an exhortative, visionary statement by one of the country's outstanding labor leaders.

122 Ahern, R. W. Positive labor relations: Plant labor management committees and the collective bargaining process. Buffalo, NY: The Buffalo Erie County Labor Management Council, 1976.

The plant Labor Management Committee (LMC) is a forum, specifically and carefully defined as separate from the negotiating and grievances forums, where the parties can jointly discuss, investigate and resolve problems where the goals of the parties are consistent or similar. The article is a useful introduction to LMC's and provides a history of LMC development. Mechanics of implementation and an agenda for an LMC are discussed. Reasons for positive labor relations programs are discussed. Emphasis is on employee participation.

123 Fulton, J. The effectiveness of a joint labor-management council on enhancing the quality of worklife and increasing perceived productivity. LSSR 32-79B, LD 45954A. Wright-Patterson AFB, Ohio: Air Force Institute of Technology, 1979.

One approach for improving productivity within the DOD is to establish joint labor-management councils (JL-MC). The objectives of this study were (1) to establish the reliable factors measured by the quality of worklife (QOWL) survey and (2) to determine the influence of the JL-MC upon the QOWL and upon perceived productivity.

124 Improving productivity: Labor and management approaches, Bulletin 1715. Washington, DC: U.S. Department of Labor, Bureau of Labor Statistics, September 1971.

Provides examples of efforts by labor and management to improve productivity through plant level practices that are under the control of management or unions. There are a number of brief case histories described under the following topics: retraining programs, work rules settlements, methods for adjusting to technological change, manpower planning, incentive plans, union-management cooperative programs, job design, absenteeism, and hours of work. The case histories are results oriented and provide little insight into procedures followed, problems encountered, etc. A good bibliography is provided.

125 Susman, G. I. A summary of the role of third parties in labor-management cooperative endeavors. Washington, DC: National Center for Productivity and Quality of Working Life, Spring 1978.

Report focuses on the evolving use of independent third parties in nonconflict situations who undertake cooperative projects between unions and managements. The third party may be a technical expert, social scientist, personnel management or labor consultant, an attorney, judge, professor, or even a local clergy. Experts or process consultants use the problem-solving approach to help define a problem, collect and analyze data, recommend and sometimes even implement a solution. Hence, the roles of facilitator, catalyst, value articulator, communication medium, and sympathetic listener are common for the process consultant, while the subject expert is a source of information, persuasion, technical instruction and research in moving the parties toward their own solution. Included are a list of organizations and university departments that provide third-party help and an excellent bibliography on evolving cooperative labor-management endeavors.

126 Zagoria, S. An evaluation of the Nassau County project. Washington, DC: Labor-Management Relations Service, 1975.

This report is a third-party evaluation of the Nassau County project. The project itself attempted and failed to establish productivity bargaining. Other productivity improvement efforts were more successful. This report gives an overview of goals, critical factors, and results.

2.6. Management by Objectives

127 Brumley, D. F. Management by objectives and governmental productivity. AD-A033695. Monterey, CA: Naval Post Graduate School. Unpublished Master Thesis, 1976.

A report which assesses the usefulness of management by objectives for government organizations. The report considers some characteristics of government organizations including: 1) the existence of complicated procedures to prevent mistakes 2) money is paid out of a budget rather than for products delivered 3) emphasis on tasks rather than on goals or achievements and 4) inefficiency does not necessarily lead to elimination of the organization. MBO is seen to be relevant to government organizations where individuals have discretionary authority for assets and when organizational effectiveness would be improved by better planning and control. A primary need is for government organizations to better define their goals and MBO can assist this process.

2.7. Organizational Development

128 Blascak, D. W., Nadal, R. A., & Schwar, J. H. An analysis of corporate organizational development experience and its implications of the future of the Army's organizational effectiveness program, AD A0 60968. Carlisle Barracks, PA; U. S. Army War College, 1978.

As the title suggests, this article attempts to draw implications for the Army OE program from corporate organizational development experience. It reviews a variety of industry programs and concludes that the Army needs to stress the strategic and socio-technical areas of O.D. The report also concludes that relatively little evaluation of O. D. has been done and that this is a definite weakness, particularly when public money is involved.

129 Cahn, M. M., & Nadal, R. A. Organization development in the U. S. Army; an interview with Lt. Col. Ramon A. Nadal. Journal of Applied Behavioral Science, 1978, 14 (4), 523-536.

An interview with a pioneer and a leading paricipant in the Army's OE program. The article covers Nadal's views of the nature of the program, resistance to the program, long-term implications and approaches to evaluating its impact.

130 Cohen, S. L., & Turney, J. R. Intervening at the bottom: Organizational development with enlisted personnel in an army work-setting. Personnel Psychology, 1978, 31, 715-730.

A 3-month experimental organizational development (OD) intervention with Army troops is carried out within a communications processing facility (lowest level in an actual military work-setting) using four groups of personnel, each with one or two noncommissioned officers (NCOs) and 12 to 14 enlisted personnel. Perceptual, attitudinal, and task performance data were collected from experimental and control groups. The results showed positive changes in troop perceptions of the quality of the work environment and supervisory relations while the number and frequency of measured productive activities improved significantly. The "at work" OD program utilized survey feedback, participative problem-solving, job enrichment, and management training techniques.

131 Crawford, K. S. Organization development in the Navy: A strategy for addressing disciplinary problems. NPRDC-TR-77-38, San Diego, CA: Navy Personnel Research and Development Center, July 1977.

Investigation of the Human Resources Management Support System, the Navy's organizational development (OD) program, as a potential technique for reducing disciplinary problems. The dependent measures, non-judicial punishment rates (NJP), were examined within matched control and experimental samples of ships that had participated in the Human Resource Management activity cycle. No empirical evidence was found to suggest that participation in the HRM cycle, per se, had any impact on NJP rates. Moderator variables such as ship size, employment schedule, and commanding officer rotation did not affect the basic findings. Hence, no definitive conclusions can be reached regarding the potential effectiveness of HRM OD activities in dealing with disciplinary problems.

132 Gay, R., & Albrecht, M. Specialty training and the performance of first-term enlisted personnel.

The authors provide a preliminary analysis of supervisory rating data assembled to explore tradeoffs among training courses of different lengths. These data consist of enlisted supervisors' estimates of military trainee net productivity at different points in first-term service. The estimates are used to construct profiles of the time path of productivity.

133 Gross, A. C., & Walter, R. S. Organizational development: Can it cut costs and improve effectiveness? Public Works, September 1979, pp. 90-92, 123.

Summarizes the city of San Diego's Human Factors in Productivity Improvement Project. The problem is an unwillingness to pay taxes coupled with a demand for better service. The authors recognized the city could not afford new capital outlay as a method for improving productivity. Consequently, they turned to identifying means to change the organization through organizational development (OD) interventions. The OD team adopted several new policies and operational methods which are discussed very briefly in the article. Evaluation findings showed productivity improvements of 25% in one experimental department compared with no change in a comparison Department. During the project, 194 out of 245 barriers to productivity or job satisfaction were eliminated.

134 Howe, R. J. Building teams for increased productivity. Personnel Journal, 1977, 56 (1), 16-22.

A case study describing the introduction of a team approach to management into a manufacturing plant. The intervention consisted of developing a management philosophy of team work from top-management down to the lowest levels of the plant. This involved developing a management philosophy and providing team problem solving capability at all levels of the organization. Evaluation of this program involved (1) improvement in pounds per unit produced each month (2) decrease in the amount of waste material carried away each month (3) improvement in the effectiveness of staff meetings measured by employer perceptions and (4) improvement in morale measured by an attitude survey. Improvement was noted in all criteria.

135 Kunkel, B. J., Broedling, L., Githens, W., & Riedel, J. An organizational development effort with civilians in the Navy. Paper presented at the Annual Convention of the Western Psychological Association, San Diego, CA, April 1979.

Describes the implementation and evaluation of an organizational change program in a Navy shore organization. The organization was a major supply activity providing supplies and related support services to fleet units and other shore activities. An organization-wide change program consisting of a survey followed by a supervisory development program was implemented. Criteria considered for evaluation were those judged relevant by management and included: distribution and inventory control, EEO, inventory reconciliation, labor relations, leadership applicants, safety, leave usage, personal attitudes, productivity, quality control/assurance, and personnel turnover--all measured by existing documentation. After examining these criteria, the researchers concluded that most were not useful as criteria of organizational effectiveness due to the following: (1) contamination by environmental influences and fluctuations, (2) indicators were so cyclical as to not be sensitive to changes brought about by the intervention. Ultimately, the intervention failed due to the failure of new military management to support the program. The authors suggest some approaches to the problem of transferring ownership of an OD intervention across a "rotating" military.

136 Langford, W. D. Organizational development: Environmental pressures, the military setting, and the ultimate test. AD-A057908. Monterey, CA: Unpublished masters thesis submitted to the Navy Postgraduate School, 1978.

Provides a theoretical assessment of the potential role of organization development (OD) in a military combat environment. The report presents a model outlining differing organizational problems at various organizational levels, joint service down to division and company, and the possible OD response to these problems.

137 Lawler, E. E., & Camman, C. What makes a work group successful? In A. J. Marrow, The failure of success. New York: AMACOM, not dated.

An investigation into the reasons why a particular work group in the shipping department of a firm is very highly productive. The authors conclude by comparisons between this and other groups that the positive results are due to high intrinsic motivation, high extrinsic motivation (group incentive plan), and group norms and leadership which promote cooperation and productivity.

138 Trask, T. J. An evaluation of organizational development as applied to the Air Force Materials Laboratory. AD 773038. Wright Patterson AFB, OH: Air Force Institute of Technology, Unpublished Thesis, 1973.

Describes the results of an organizational development program as applied to the Air Force Materials Laboratory. The goals of the intervention were to enhance the effectiveness of the top management team, to reduce dysfunctional competition, improve communications, increase use of goals and objectives, decentralize decision making and help promote human resource development. The goals of the OD - team building intervention were assessed through a survey especially designed for the study. Results were generally positive considering a comparison between existing perceptions and a perceived baseline - "what was it like before the OD intevention." No end-result tangible outcomes were measured.

139 Vollmer, H. M., McAulifle, J. J., & Pedersen, W. C. Organizational design: Process and concepts. Report for AFOSR Contract No. F 44620-67-C-0039. AS 684 168. Menlo Park, CA: Stanford Research Institute, 1968.

Provides an analytical approach to the study of organizational design. The approach is both theoretical and applied in that principles are derived from case studies. Study includes a useful, albeit general, review of considerations in the evaluation of organizational design changes.

2.8. Feedback of Performance Results

140 Kirby, P. G. Productivity increases through feedback systems. Personnel Journal, 1977, 56 (10), 512-515.

The author describes how simple feedback systems, using existing data, caused productivity gains of 10 to 33 percent in three manufacturing plants. The gains were long-lasting and were accompanied by a 75% drop in grievances. The technique was daily posting of production level in a visible place next to the (management set) production goals. Results may have been contaminated by other management changes.

141 Meyer, H. H. Feedback that spurs performance. In A. J. Marrow, The failure of success. New York: AMACOM, not dated.

Discusses the results of research investigating the impact of feedback on performance in highly structured factory jobs. Showed a slight improvement in percentage of rejected lots when persuasion was used, an initial 20-25% drop in rejects when knowledge of results was used but a return to old levels in 6 weeks. Phase III added negative reinforcement to feedback and found a drop in rejects from 20% to 0 which held for 6 weeks - the end of the project. Other examples of feedback effects are also discussed.

142 Migliore, R. Improving worker productivity through communicating knowledge of work results. Management of Personnel Quarterly, Summer 1970, 26-32.

Reports the results of two studies which studied the impact of knowledge of results on efficiency in a unionized manufacturing plant. In the first study, knowledge of results was presented by posting production data, supervisory contact, and increased off-the-job socialization. In the second study, information was provided only through posted data on the bulletin board. The results showed that the presentation of feedback in Study I was most effective. Posting of data alone had a negligible effect on performance.

143 Pritchard, R., Montagno, R., & Moore, J. Enhancing productivity through feedback and job design. AFHRL-TR-78-44, AD-A061 703. Brooks AFB,TX: Air Force Human Resources Laboratory, Occupation and Manpower Research Division, August, 1978.

Describes a research study in a simulated work setting which investigates the impact of various forms of job performance feedback on productivity. The results suggest that feedback regarding job performance has considerable potential for impacting productivity.

2.9. Other Organizational Approaches

144 Andolsek, L. J. Productivity and the public sector: The desire to work. Vital Speeches of the Day, 1974, 40 (7), 212-214.

This speech by a Commissioner at the former U. S. Civil Service Commission discusses worker alienation. The author prescribes making the worker feel part of the "bottom line" of service and taking steps to humanize the worker-machine relationship. He discusses very briefly a number of productivity improvement efforts being carried out in the Federal government and private industry.

145 Berman, M. B. Improving SAC aircrew and aircraft scheduling to increase resource effectiveness. R-1435-PR. Santa Monica, CA: United Air Force Project Rand, July 1974.

Describes the inefficient scheduling environment across sample SAC wings and among their respective operations and maintenance functions. The conclusion is schedules do not have information systems or decision-oriented scheduling systems to assist them in meeting multi-objective tasks. Furthermore, they do not have feedback concerning how the other SAC wings are meeting objectives. A very detailed data analysis of measures of performance actually achieved is provided. The thrust of this excellent report is the need for information systems, decision aids and feedback as necessary ingredients for improving productivity in terms of effectiveness and efficiency.

146 Bumbarger, W. B. O.F.A.: Key to lasting overhead productivity improvement. Financial Executive, 1977, 45, pp. 40-48.

Discusses an approach for measuring and improving productivity of indirect or overhead functions. The basic method called Operation Function Analysis (O.F.A.) focuses on the source of the demand for a service and estimates its costs. With the O.F.A. ratio (e.g., number of hours of indirect labor required per commercial order received), the manager can determine the percentage of a group's resources consumed by a function and evaluate the need for the function. O.F.A. is illustrated through the use of a case study applied to a purchasing organization. The case demonstrated that application of O.F.A. was able to reduce order monitoring and expediting by 15 percent.

147 Campfield, W. L. Analysis of employee productivity and development. Personnel Journal, 1961, 40 (6), 257-260; 273.

An official of the U. S. Army Audit Agency, stresses that periodic reviews and analyses of employee productivity and development are necessary if management is to achieve maximum overall production potential and avoid serious personnel problems such as high turnover, low morale and alienation. One or more qualified professional "analysts" in every organization should perform suggested detailed reviews taking into account several specific aspects of each of the following areas: (1) soundness of organizational structure and leadership capability, (2) effectiveness and completeness of communication methods and sensitivity of supervisor.

148 Chace, H. Civil engineering shop labor productivity: A framework for analysis. LD 44592 A. Maxwell AFB, AL: Air Command and Staff College, Air University, 1979.

The Air Force Engineering Technology Office is examining alternatives to the present craft shop organization as a means of improving shop labor productivity. This study complements that effort by developing a customer center perspective of shop labor productivity and by constructing and testing a productivity enhancement systems model. The study is based on the synthesis of three major management concepts: (1) Drucker's views of management by objectives and goal setting; (2) Cleland and King's application of systems analysis to organizational performance; and (3) Herzberg's employment of job enrichment. Based on this model the author concludes that: (1) consolidating shops and producing the grades of supervisors and craftsmen is a counterproductive measure. (2) Consolidation at the superintendent level would improve shop productivity. (3) Application of job enrichment techniques, improvement of shop participation in the upward mobility program and enhancement of "prime beef" training would also improve shop labor productivity.

149 Comptroller General of the United States. Air Force maintenance depots: The need for more responsiveness to mobilization as well as peacetime efficiency. Washington, DC: General Accounting Office No. L.C.D. -78-403, November 1977.

Describes a GAO audit of USAF Air Logistics Centers. The report addresses the topics of planning for maintenance depots, responsiveness to mobilization, measurement of peacetime productivity and motivation of the workforce. Recommendations are made to address the weaknesses discovered in each area. The study is based on the assumption that efficient peacetime operation is a prerequisite to efficient mobilization for a wartime environment.

150 Corbin, L. J. Productivity and job satisfaction in research and development: Associated individual and supervisory variables. AFIT/GSM/SM/775-2, ADA045981. Unpublished masters thesis presented to the Air Force Institute of Technology, 1977.

Investigates relationships between supervisory and individual variables and job satisfaction and production of scientists and engineers in an Air Force R&D Laboratory. Measures of production were self-reports of output and job satisfaction was measured by the Hoppock scale. Independent variables included the Supervisory Behavior Description Questionnaire, Leaser Reward Behavior Instrument, and the Rotter Internal-External Control of Reinforcement Scale. Results showed no significant relationships between production and job satisfaction, although grade, education and experience were positively related to level of output.

151 Cox, J. H., & Lewis, J. B. An analysis of non-behavioral factors affecting work order time and cost productivity. AD A016032. Wright-Patterson AFB, OH: Air Force Institute of Technology, Unpublished Master's Thesis, 1975.

Reports the use of multiple linear regression analysis in an analysis of the factors impacting productivity in the Air Force base civil engineering function. Twenty-five predictor variables were defined from existing data in the Base Engineer Automated Management System. Output measures could not be defined so productivity was defined as the ratio of estimated to actual time to complete a job and a corresponding ratio of estimated to actual costs. Regression equations analyzing data across shops (e.g. plumbing, carpentry) explained approximately 30% of the variation in cost productivity and 33% of time productivity; however, interpretation of the results was difficult. Analyses by individual shops yielded equations explaining more variance (up to 57%); however, small sample sizes make the results questionable. The methodology utilized in this study warrants further consideration.

153 Frew, D. R. Transcendental meditation and productivity. Academy of Management Journal, 1974, 17 (2), 362-368.

The author collected data from practitioners of transcendental meditation (TM) and their supervisors and colleagues, as well as a "control group" of non-practitioners of TM. The data support the existence of a positive relationship between TM and productivity, especially at higher levels in organizations and in more democratic settings. Due to methodological weaknesses (most data are self-observational), these results should be taken as suggestive only.

153 Goldberg, J., Holzer, M., Guellion, R., & Zalk, C. Transit productivity: Improvement through training and development. New York: The Center for Productive Public Management, John Jay College of Criminal Justice, June 1959.

Describes the conditions that influence productivity and the role of management, labor and the public. Problems that confound the issue of transit productivity are discussed. Given all elements that influence productivity, it turns to management training as a solution. The conclusion is that efficient and effective internal transit management attained through training and development is the key to improved transit productivity. Four training models are described.

154 Hewett, T. T., O'Brien, G. E., & Hornik, J. The effects of work organization, leadership style, and member compatibility upon the productivity of small groups working on a manipulative task. Organizational Behavior and Human Performance, 1974, 11 (2), 283-301.

Investigated the relationships between task organization (independent, coordination, collaboration), leadership style (task vs. person oriented) and group compatibility (compatible, incompatible) on productivity of a laboratory task of 45 minutes duration. Results showed that compatible groups were most productive and that groups requiring collaboration showed lower productivity than those requiring coordination or when workers were independent. The artificial nature of the situation and the task's short duration make any generalization very tenuous.

155 Hlad, D., & Vetter, P. The effect of interruptions on the productivity of civil engineering planning technicians. AD 776 785. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1974.

In civil engineering planning shops there is presently a significant discrepancy between the amount of time originally programmed for planned work orders and the time that is actually spent in the performance of planned work. This discrepancy has been attributed to the low productivity ratio of the planning technicians (PTs). Several factors can adversely affect the performance of PTs. The most significant factor, however, appears to be outside interruptions (personal and telephone interruptions). The purpose of this thesis was to evaluate the effects of interruptions on PT productivity and quality. This was accomplished through an experimental field study conducted within the civil engineering planning section of Wright-Patterson Air Force Base Civil Engineering Squadron. The experimental design employed matched pairs and used interruptions as the "treatment" variable.

156 Horowitz, S. A., & Sherman, A. The characteristics of naval personnel and personnel performance. Professional Paper No. 180, AD-A039050. Arlington, VA: Center for Naval Analysis, 1977.

Examines relationships between readiness of Navy ships and characteristics of enlisted personnel assigned. Readiness is operationally defined as the material condition of shipboard equipment - downtime per month- reported by a standard casualty reporting system. Findings show that the relationships between personnel characteristics and readiness are substantial but vary as a function of the particular occupational specialty involved and equipment complexity. Policy implications for personnel assignment policies are presented.

157 Innovation and productivity in research and development: Some associated individual and organizational variables. AFIT-TR-76-10, AD-A032 273. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1976.

This document contains a report on the relationships between organizational variables and the innovation and productivity of scientists and engineers in research and development laboratories. Innovation and productivity were viewed as two separate dimensions of scientific/engineering output. A list of organizational variables was developed from relevant empirical studies in the literature and tested for their relationships with the criteria. The method included a questionnaire administered to the individual scientist/engineer that provided data for the peer ratings and most of the organizational variables. Questionnaires from the group leaders and information from lab records provided data for some other organizational variables.

158 Jamali, S. A. K. City boosts waste collection productivity. Industrial Engineering, July 1977, pp. 36-39.

Describes a simulation approach to identification of the route characteristics that significantly affect productivity of solid waste collection.

159 Kilbridge, M., & Wester, L. An economic model for the division of labor. Management Science, 1966, 12 (6), B255-B269.

This article lists the variables which combine to determine optimum cycle time (time spent by the product at each work station) on an assembly line. The variables are: imbalance-of-work cost, nonproductive-work cost, learning cost, and wage cost of skill. The authors measure and plot the first three variables and calculate optimum cycle time. A strong relationship between unit labor cost and volume is apparent and seems to be explained solely by the distribution of learning costs across a larger number of units.

160 Long, J. S. Productivity and academic position in the scientific career. American Sociological Review, 1978, 43, 889-908.

An examination of the interrelationships between scientific productivity and academic position during the early careers of 181 Ph.D. biochemists employed in U.S. graduate school departments. A longitudinal research design is used to isolate the effect of productivity of position allocation from the effect of departmental location on productivity. Unlike much of the recent empirical research on this topic, the empirical results show a strong, significant effect of departmental location on productivity and only a weak relationship between productivity and position prestige. Productivity was measured by publications and citations.

161 Multi-municipal productivity project, An approach to productivity improvement in the public sector. Report prepared under U. S. Department of Labor Contract L 74-74, PB 253 645. New York: Nassau County, 1975.

Describes a four-stage productivity enhancement program based on the premise that the productivity of municipal services is measurable and can be improved through systems analysis by trained analysts. Program involves four stages: (1) attitude survey of random sample to establish baseline measures, (2) micro productivity improvement program -- building on small successes, (3) macro program -- installing the methodology system-wide, and (4) productivity bargaining to share savings. Categories of measures used include: cost savings, output per manhour, units per employee, through-put time, and down-time for an individual or piece of equipment.

162 Nollen, S. Does flexitime improve productivity? Harvard Business Review, 1979, 57, pp. 12-22.

This work scheduling innovation called flexitime was first introduced in Germany in 1967 and was first used in the U.S. in the early 1970's. Under flexitime, employees choose their arrival and departure times within limits set by management. Usually organizations establish core hours when all employees must be present with a flexible time period at both ends of the working day. Based on survey data and reported case studies, there is some evidence that flexitime has positively affected productivity. In eight surveys covering 445 organizations, 48% subjectively reported increased productivity. In 14 case studies covering opinion data from 10,000 hourly employees and over 500 supervisors, the median proportion of employees claiming productivity improvements was 45%.. Organizations reporting hard measures of productivity showed a median improvement of 12% in the private sector and 2-5% in the federal government.

163 Ranftl, R. M. Improving R&D productivity - A study program and its application. Research Management, 1977, XX (1), 25-29.

Presents an overview of a major 2-year wide-ranging study conducted by Hughes Aircraft Company to study productivity in R&D functions.

164 Schmitt, B. An analysis of wartime worker productivity at the 60-hour work week. AD-B005 299L. Maxwell AFB, AL: Air Command and Staff College, Air University, 1975.

Current Air Force war plans require that a large portion of the military work force operate at a 60-hour work week during wartime conditions (10 hours per day and six days per week). No provisions are made for reduced worker productivity at the increased work levels. This study analyzes the relationship between hours of work and labor productivity based on 110 historical case studies. There was near unanimity among all historical data that a constant relationship does not exist between scheduled work hours and labor productivity. Two conclusions are drawn by the author. First, the final study data indicate that an 8.53 percent productivity decrease can be expected when the 60-hour wartime work week is implemented. Second, worker fatigue is the primary reason for the decreased productivity.

165 Stahl, M. J. Innovation and productivity in research and development: Some associated individual and organizational variables. AFIT-RE-76-10, AD-A032 273. Wright-Patterson AFB, OH: Air Force Institute of Technology, May 1976.

The author uses questionnaires and peer rating systems to detect relationships between organizational factors and R&D laboratory innovation and productivity, where innovation is orginality and usefulness, while productivity is level of output. Both independent variables were measured with peer rating systems and compared to other indicators (such as number of publications) to check validity. Findings: perceived rewards for innovation were positively related to both innovation and productivity.

166 Stogdill, R. M. Group productivity, drive, and cohesiveness. Organizational Behavior and Human Performance, 1972, 8 (1), 26-43.

The author reviews some 65 research studies published since 1943 and categorizes them into the intricate interrelationships of group productivity (P), drive (D), and cohesiveness (C). He argues that these three variables should be thought of as three essential dimensions of group performance even though he had categorized them in his own earlier research as primary outputs of any organized group. After defining group productivity, drive, and cohesiveness, and citing numerous relevant studies of their relationship, the author concludes that the weight of the available research evidence does not support the view that group cohesiveness leads to high productivity. Rather, it appears that group drive (or motivation) is the variable most consistently related to productivity, while P and C tend to be positively related under conditions of high group drive and negatively related when drive is low and routine operating conditions exist.

167 Total performance management: Some pointers for action. Washington, DC: National Center for Productivity and Quality of Working Life, 1978.

Describes a 9-step procedure for a program to improve productivity in the public sector. The steps are described with examples: (1) planning the TPM project, (2) orienting participants, (3) collecting and analyzing data, (4) designing and administering employee survey, (5) designing and administering the customer survey, (6) tabulating and interpreting data, (7) providing feedback of results to workers/managers, (8) planning actions to correct deficiencies, and (9) conducting ongoing assessment and data collection.

3. Productivity and Quality of Working Life Case Studies

168 Bryant, A., Brewer, D., Beasley, W., Wagner, P., & Adlfinger, A. Survey of productivity measurement systems in non-government organizations. Rock Island, IL: U.S. Army Management Engineering Training Agency, May 1972.

Report describes results of interviews with representatives of 12 private companies concerning their productivity programs. A very limited statement concerning measurement is provided. Twenty-four cases are summarized. Eight cases capture the essence of the programs. Described are wage incentives, standard units and management by objectives, standards and deviations from the standard, value analysis of tasks directed at corporate goals, positive reinforcement, and post-audits of large capital investment programs. Reasons why such measures were not widely employed are discussed. There is also a discussion of Federal government disincentives.

169 Hinrichs, J. Practical management for productivity. New York: Van Nostrand Reinhold Company, 1978.

Focuses on 12 case studies which have shown increases in quantity and/or quality of work, reduced operational cost and improvements in employee attitudes and morale. Studies presented are grouped into three sections. Section one includes the use of incentives and rewards. Section two discusses various applications of participative management, and the final section deals with structural changes in organizations.

170 Hornbruch, F.W. Raising productivity; Ten case histories and their lessons. New York: McGraw-Hill Book Company, 1977.

One effective way to present ideas for enhancing productivity is through case studies. This book discusses 10 diverse case studies illustrating various approaches to productivity improvement in a variety of organizational types. The cases illustrate use of incentives and performance standards, tool design, employee participation, technological innovation, and improved work methods. The last five chapters comprise a reference section on organizational structure and policy issues that impact on productivity. While claims for dramatic productivity improvements are made, the evaluations reported are not sufficient to attribute the results solely to the programs described. Nevertheless, this book discusses a wide range of possibilities and presents principles which might be successfully applied elsewhere. However, extrapolation of these results to other settings should be done with considerable caution.

171 Improving governmental productivity: Selected case studies. Washington, DC: National Center for Productivity and Quality of Working Life, Spring 1977.

Contains nine case studies concerning service delivery productivity. Good examples of what to measure are included in each case study. The report provides a broad based examination of how public agencies examine themselves. Discussions on the need for careful interpretation of data are valuable as are those concerned with the use of productivity measures in budget formulation and defense.

172 Katzell, R. A., Bienstock, P., & Faerstein, P. H. A guide to worker productivity experiments in the United States. New York: New York University Press 1977.

Published literature (mainly behavioral science and personnel management) during the period 1971-1975 was reviewed, and 103 field experiments were found which dealt with productivity improvement in an organizational setting. Each of these 103 studies is summarized in a one page abstract. Of the 103, 20 were conducted in non-profit organizations, such as hospitals or clinics, and 9 dealt with public agencies. The remainder were from industrial or business organizations. Eighty-five reported favorable effects on some aspect of productivity.

The types of productivity enhancement programs are classified into 14 categories: (1) selection and placement, (2) job development and promotion, (3) training and instruction, (4) appraisal and feedback, (5) management by objectives, (6) goal setting, (7) financial compensation, (8) job design, (9) group design, (10) supervisory methods, (11) organizational structure, (12) physical working conditions, (13) work schedule, (14) sociotechnical systems.

Each abstract is cross-classified in terms of the type of program, type of criteria used to measure productivity, occupational category involved, industry type and author.

173 Productivity programs in the federal government, case studies, Volume II. LD 38749 B. Washington, DC: Joint Financial Management Improvement Program Report, July 1976.

Describes 11 case studies where productivity improvement programs were conducted. Also describes four case studies related to improved performance measurement programs. A job enrichment program introduced at the Ogden Air Logistics Center is described. Employee participation is highlighted in a successful material processing effort within a Marine Aircraft Wing. Capital investment and its effect on productivity is highlighted in an effort at a Naval Air Rework Facility. The importance of a thorough front-end analysis to determine high cost "drivers" is underlined in a program conducted at the Anniston Army Depot. Two Total Performance Measurement programs are described which emphasize the importance of good measurement in a successful productivity improvement program.

4. Productivity Measurement

4.1. Effectiveness Measurement

174 Adam, E. E., Jr. Hershauer, J. C., & Ruch, W. A. Measuring the quality dimension of service productivity. Tempe, AZ: Arizona State University, January 1978.

Provides a system-oriented general definition for productivity and quality along with conceptual schematic models with explanation of factors affecting worker productivity and product/service quality. The report describes a methodology for measuring the quality dimensions of productivity particularly for a service-type organization. The scheme requires direct employee participation and is a strictly structured process. The focus is on deviations, specifically quality type deviations along with generation of measurement rates and indicators. Actual application of the method is described for two functions of the Federal Reserve System banks.

175 Armenakis, A. A., & Feild, H. S. Evaluation of organizational change using nonindependent criterion measures. Personnel Psychology, 1975, 28 (1), 39-44.

The authors point out that measures of productivity taken from the same organization over time are not statistically independent. Time series data of this type are correlated due to the fact that organizations generally show an increasing trend. Thus a hidden danger in evaluating the results of an organizational development effort over time may exist. The authors propose a statistical method for dealing with such non-independent criteria and for estimating the "real" impact of the organizational change.

176 Austin, L. Procurement productivity indices. LD 30278A. United States Air Force Academy, CO, 1974.

The basic objective of this research was the development of comparative indices which accurately measure changes in effectiveness of the USAF procurement function over time. Management indicators for the procurement area have historically reflected output in terms of the number and/or dollar value of contracts issued. Little consideration was given to the relative complexities of the types of contracts or the necessary administrative actions which preceded award. The planned method of measurement was to weight various types of contracts and use a composite for each activity for comparison to previous periods.

177 Barton, A. H. Organizational measurement and its bearing on the study of college environments. Princeton, NJ: College Entrance Examination Board, 1961.

This report reviews literature on the subject of organizational measurement with particular emphasis on those studies which relate to educational organizations. Following a clear and logical structure, the authors discuss a wide range of variables organized in terms of input, output, environmental, social, structure, attitudes, and activities. Appendices provide easy reference to the sources reviewed in accordance with this classification scheme.

178 Bowser, S.E. Determination of criteria of operational unit effectiveness in the U.S. Navy, NPRDC TR 76-41, AD-A029 387. San Diego, CA: Navy Personnel Research and Development Center, 1976.

Describes the results of structural interviews with a sample of 68 Navy managers. The focus of the interviews was on criteria of organizational effectiveness viewed relevant by managers. Responses were content analyzed and summarized by major categories of response. Results showed managers to be immediate performance oriented although some differences in emphasis appeared as a function of grade and unit. The report also includes a review of studies concerned with organizational effectiveness criteria.

179 Bowser, S. Measurement of unit effectiveness: A criterion development problem. San Diego, CA: Unpublished manuscript, NPRDC, undated.

Conducted structured interviews of 67 Navy managers and staff officers to gather data about their definitions of organizational effectiveness, criteria used to assess effectiveness and organizational goals. Data were content analyzed in terms of three dimensions: (a) whether responses applied to input/output or process aspects of system model, (b) whether criteria are objective or subjective and (c) whether criteria applied to individual, organization or both. Results showed that Navy operational managers are immediate performance oriented while staff members tend to be more concerned with process - how the job is done. Most important evaluation criterion from managers' viewpoint was "meeting operational commitments" (83.8%) followed by "efficiency" (47.1%). Although 20% felt that training was important to effectiveness, no one felt that training should be used to measure effectiveness.

180 Bowers. D. G. Perspectives in Organizational Development. Report prepared under Office of Naval Research Contract No. N 000 14-67-A-0181-0013, AD 711312. Ann Arbor, MI: Institute for Social Research, 1970.

Provides a statement of problems in the organizational development area. For one interested in measurement of organization effectiveness, the report includes a brief but useful discussion of the basic dimensions of organizational effectiveness.

181 Cameron, K. Measuring organizational effectiveness in institutions of higher education. Administrative Science Quarterly, 1978, 23, pp. 604-634.

The author categorizes the nature and sources of criteria for evaluating organizational effectiveness. Dimensions include (1) universal - organization specific, (2) normative - descriptive, (3) organizational level, and (4) outcomes - input - processes. This study had identified organization specific, descriptive, dynamic criteria applied to outputs, inputs, and process. These criteria were then used to rank six institutions of higher learning. The resulting profiles show both differences in purpose and differences in total effectiveness. This multi-dimensional approach to measuring organizational effectiveness has potential applications to productivity.

182 Campbell, J. P., Bownas, D. A., Peterson, N. G., & Dunnette, M. D. The measurement of organizational effectiveness: A review of relevant research and opinion. Final report for Navy Personnel Research and Development Center Contract No. N00022-73-C-0023, AD 786 462. Minneapolis, MN: Personnel Decisions, Inc., 1974.

The concept of organizational effectiveness has been a pervasive but elusive one in the literature. This technical report presents a comprehensive review of various models and measures of organizational effectiveness. The authors catalog 25 different measures which have been used to operationalize the concept. The report also catalogs measures of climate, and various correlates of organizational effectiveness. Concluding the report are recommendations for Navy research efforts that would help shed light on this confused topic. This article concludes that the field of organizational effectiveness research is characterized by a lack of systematic thinking and fragmentation with respect to an appropriate set of measures. However, this report has helped illuminate the problems of the field and recommends some fruitful avenues for additional research.

183 Coulter, P. B. Organizational effectiveness in the public sector: The example of municipal fire protection. Administrative Science Quarterly, 1979, 24 (1), 65-81.

Discusses and analyzes theoretical models of organizational effectiveness and the relationship between productivity and effectiveness. Favors a goal achievement view of effectiveness, however, recognizing that process-centered and attitudinal models probably are the "means" by which the goals are achieved. Describes application of the goal centered model to municipal fire protection and analyzes the relationships of environmental variables to each of four criteria of effectiveness - efficiency, suppression effectiveness, prevention effectiveness and productivity.

184 Engel, J. E. A study of the relationship between worker attitudes and organizational effectiveness in an air logistics center maintenance directorate. AFIT-LS-3-77, AD-A044586. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1977.

Two basic questions are addressed in this research: (1) whether workers' perceptions of effectiveness agree with actual measures of organizational output, and (2) whether multidimensional relationships exist between perceived effectiveness and work attitudes. Participants consisted of 385 civilian maintenance, electronics, gyro and precision equipment, and industrial products workers. In general, perceived effectiveness along the eight effectiveness dimensions was associated with higher actual unit effectiveness measured as efficiency (earned hours/actual hours) although no statistical test was reported. Using canonical correlation, multivariate relationships were found between perceived effectiveness and attitudinal data. The author interprets these findings in terms of nine management guidelines.

185 Ghorpade, J. Toward a methodology for the study of organizational effectiveness. In J. Ghorpade Assessment of organizational effectiveness: Issues, analysis, and readings. Pacific Palisades, CA: Goodyear Publishing Company, 1971.

Reports the results of a field study which compares the organizational effectiveness of two groups of sugar factories in India. One group is privately owned and the other is State sponsored and cooperatively owned and operated. The author focuses on the methodological implications of the study and concludes that quantitative and qualitative measures of effectiveness can lead to different and confounding conclusions regarding the effectiveness of organizations.

186 Harrold, R. W. An evaluation of measurable characteristics within Army laboratories. IEEE Transactions on Engineering Management, EM-16, 1966, 1, 16-23.

Investigated relationships between so-called "measurable aspects" of military R&D laboratories and standards of performance. Standards selected were number of papers produced, number of invention disclosures, and ratings by military R&D executives. Measurable characteristics studied were variables such as number of civilians, number of seminars held, length of R&D experience for military personnel, etc.

187 Hatry, H. P. Measuring the effectiveness of nondefense public programs. Operations Research, 1970, 18 (5), 772-784.

This paper discusses the need for output measurement (1) that uses measures which are directly related to basic governmental objectives, (2) that includes multiple measures when appropriate rather than attempting to compress various dimensions into one criterion, when this would involve oversimplification, (3) that identifies the differential effect on different population subgroups, (4) that does not excessively use "proxy" or "lower-level" criteria without at least briefly examining the relation of the proxies to the basic objectives, and (5) that, where appropriate, uses qualitative subjective measures rather than neglecting important effects.

188 Hatry, H. P. Issues in productivity measurement for local governments. Public Administration Review, 1972, 32 (6), 776-784.

Since productivity measurement means relating the amount of inputs of a service or product to the amount of outputs, local governments' productivity measurements will be particularly useful if comparisons are developed systematically over time, with other jurisdictions, and among operating units within a jurisdiction. Local governments must do more to define the specific service funtions in input and output terms. The author develops illustrative workload measures, quality factors, and local condition factors that can enhance productivity measurement. After analyzing the issues in measuring productivity in solid waste collection and police crime control, an informative illustration is developed for the measurement of solid waste collection that integrates the above considerations, including current and real costs and the calculation of four specific productivity indices.

189 Hatry, H. P. The status of productivity measurement in the public sector. Public Administration Review, 1978, 38 (1), 28-33.

The Urban Institute's Director of State and Local Government Research stresses that public sector productivity encompasses two basic dimensions: (1) efficiency--producing a given output with minimal resources, and (2) effectiveness--providing a level of public services of a given quality. Efficiency measures may be based on quantity and quality ratios, utilization-availability rates, and year-to-year productivity indices. Although the federal government uses traditional output/input efficiency measures for major functions and some individual agencies, both the federal as well as state and local governments make very limited use of effectiveness measures. Even though not yet widespread, emerging measurement methods include (1) ratios of work accomplished to inputs in employee hours or dollars, (2) engineering work standards, (3) citizen/client/trained observer effectiveness ratings, and (4) total performance measurement systems (TPMS), in which performance data are collected on both output per unit of input and client perceptions of service quality.

190 Hendrix, W. H., & Halverson, V. B. AD-A068 476. Organizational survey assessment package for Air Force organizations. AFHRL-TR-78-93. Brooks Air Force Base, TX: Occupation and Manpower Research Division, Air Force Human Resources Laboratory, February 1979.

Describes the basis for and development of an Organizational Assessment Package (OAP). The issue is improving organizational effectiveness. The OAP provides a means for identifying strength and weaknesses and it is a source of information to be used in appropriate educational curricula. The basis for construction of the OAP is Hendrix's Three Component Organizational Effectiveness Model where effectiveness is a function of the criterion selected, managerial style employed and situational environment. The series of test instruments are provided.

191 Hershauer, J. The quality dimension of police service productivity: Village of Tinley Park, Illinois. Public Productivity Review, 1979, 3 (3), 75-86.

Assessments of productivity typically deal with the quantitative aspects of performance rather than the qualitative aspects. This article addresses a technique for auditing quality of police officers as perceived by police department personnel, both managers and police officers. The three major areas for quality measurement concern were (1) responding to and following up on reported crime, (2) filling out required forms, and (3) interacting with citizens.

192 Improving productivity and decision-making through the use of effectiveness measures. Working Procedures Manual 1, Dallas, TX: City of Dallas, February 1979.

Describes the strategy and procedures for generation of effectiveness measures for the City of Dallas. It is a preliminary report that does not describe data gathering or analysis. An innovative program management strategy is discussed which introduces cost vs. benefit considerations for improving productivity. Emphasis is on meeting public goals and the need for measuring citizen satisfaction. The report provides a list of criteria to use for choosing appropriate sources for the pilot project. The report provides a discussion on designing an interview instrument plus an example of a pre-interview statement that may help set the stage for the interview. A structured interview analysis is described. Data collection and analysis and validation of the procedures is not reported in the first manual.

193 Likert, R. Human organizational measurements: Key to financial success. Michigan Business Review, 1971, 23 (3), 1-5.

In this article, the author discusses the characteristics of effective management systems, and the benefits of measuring "lead time data." This lead time information includes such measurements as the leadership behavior of administrators and reveals the extent to which an agency is capable of performing in an efficient and productive manner. The predictive value of such measurements is indicated by a study showing that managerial behavior measures were statistically unrelated to cost performance when the data were collected at the same point in time. However, measures of managerial behavior explained one-fourth of the variation in cost performance between cost centers when cost data were collected after 12 months. After 24 months, the variance explained by managerial behavior measures doubled. The article concludes with a discussion of the application of organizational measurements to program planning budgeting systems when end result measures are not measurable.

194 Macy, B. A., & Mirvis, P. H. A methodology for assessment of quality of work life and organizational effectiveness in behavioral-economic terms. Administrative Science Quarterly, 1976, 21, 212-226.

Utilizing industrial engineering, accounting, work-measurement, and behavioral concepts the authors propose a conceptual framework for designing and measuring a standard set of behavioral outcomes. The approach defines two sets of measures: member participation and role performance. Participation measures include absenteeism, tardiness, turnover, work stoppages, and strikes. Performance measures include productivity, product or service quality, grievances, accidents and job-related illnesses, unscheduled downtime, and unaccounted for inventory, material, and supply utilization variances. Operational definitions are provided for each index and their use is illustrated in a longitudinal field study.

195 McBryde, D.G., et.al. Force development: The measurement of effectiveness. USADCD pamphlet 71-1, LD 28955. Fort Lee, Virginia: U.S. Army Logistics Center, Operations Analysis Directorate. 1973.

This pamphlet provides assistance to the military operations analyst and guidance for the combat developments study officer in the selection and use of appropriate measures of effectiveness to evaluate and compare land combat systems and subsystems. The scope of the pamphlet covers the development, formulation, and use of measures of effectiveness in the combat developments process. Included are the roles of measures of effectiveness in the analysis, test and experimentation, and documentation of Army doctrinal, organizational and material systems concepts. The critically important role of measures of effectiveness in the decision process for combat systems development is highlighted. A compendium of examples of measures of effectiveness is provided that illustrates the methodology.

196 Measuring the effectiveness of basic municipal services. Washington, DC: International City Management Association and the Urban Institute, February, 1974.

This report focuses on the methodology of effectiveness measurement as applied to the measurement of the impact of various municipal services, e.g., solid waste collection, recreation services, library, crime control, transportation, etc. The methodology and approach can be applied to develop effectiveness measures for other functional areas as well.

197 Ostrom, E., Parks, R., Percy, S., & Whitaker, G. Evaluating police organization. Public Productivity Review, 1979, 3 (3), 3-27.

An excellent article addressing the problems of conceptualizing productivity in public organizations. A service production model is presented and illustrated through the use of police services. Four criteria are proposed as evaluative criteria for public organizations: effectiveness, responsiveness, equity, and efficiency. Each of these criteria is defined and illustrated using hypothetical examples drawn from the area of law enforcement.

198 Price, J. L. The study of turnover. Ames, IA: Iowa State University Press, 1977.

Provides a codification of research dealing with turnover defined as "the degree of individual movement across the membership boundary of a social system." This work is a cogent and comprehensive treatment of the subject of turnover and contains chapters dealing with definition, measurement, correlates, extent of turnover, and determinants and intervening variables.

199 Ruck, H. W., & Edwards, J. O. Measurement of changes in organizational effectiveness of security police squadrons. Washington, DC: Paper presented at the 4th Annual Workshop on the Role of Behavioral Science in Physical Security, July 25, 1979.

In this paper the authors describe a research design for evaluating the effects of a new organizational structure on the effectiveness, satisfaction, job content, and organizational climate of security police. The design is a pre-/post-control group design. Of primary interest is the approach utilized to develop hard measures of productivity. While the specific indicators are not presented, the authors describe in general terms the eight steps involved in this participative method for generating indicators of effectiveness.

200 Schneider, R. W. A model for measuring effectiveness in a security organization. AD-A032334. Monterey, CA: Naval Postgraduate School, Unpublished masters thesis, 1976.

Describes the application of the Delphi technique to the generation of effectiveness measures for a Navy security organization. The approach generates six output indicators for three security functions: unauthorized base admissions, failure to secure, and response time. In addition the approach uses a weighting scheme for combining quantitative indicators into a single index of effectiveness.

201 Smith, H. L., & Watkins, L. E. Managing manpower turnover costs. The Personnel Administrator, 1978, 23 (4), 46-50.

The authors clearly show the costs of employee turnover and how to measure them. Companies or agencies who monitor this organizational cost are in a good position to decide how much to spend to reduce turnover and whether attempts to reduce it were successful or worthwhile.

202 Spencer, L., & Cullen, B. Taxonomies of organizational change: literature review and analysis. TR-78-A23, Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences, 1978.

This report presents a taxonomy and data collection methodology for assessing Army organizational effectiveness (OE) interventions. Included is a literature review covering different ways of classifying organizational change programs. The report also includes a data collection methodology for capturing the important ingredients of Army OE intervention case studies. This report provides a useful overview of various types of enhancement programs.

203 Steers, R., Porter, L. Mowday, R., & Stone, E. Problems in the measurement of organizational effectiveness. TR No. 1, Contract No. N00014-76-C-0164, AD-A018 709. Eugene, OR: University of Oregon, Office of Naval Research, 1975.

This paper reviews 17 multivariate models of organizational effectiveness in terms of their primary evaluation criteria, their normative or descriptive nature, their generalizability, and their derivation. Little consistency was found in the evaluation criteria of the models. Eight problems of such models are discussed which appear to reduce their utility for the study of organizational effectiveness. Suggestions are advanced for future work to focus on operative goals and goal optimization to further an understanding of the effectiveness construct in on-going organizations.

204 Welch, J. S., & Simmons, T. Measuring depot performance. Army Logistician, March-April 1979.

Describes the Army Depot System Command's (DESCOM) standardized review and analysis program that provides a comprehensive measure of the performance of its headquarters and the depot system. DESCOM includes 12 depots and 7 depot activities with 38,000 employees. The system has three components: (a) contract between depot manager and DESCOM commander, (b) quarterly performance indicator review on 400 performance indicators, and (c) Headquarters review and analysis. Item (a) involves commander obtaining resources in exchange for performance as measured by 25 indicators.

205 Young, H. H. Development of an effective planning and evaluation model for Air Force maintenance organizations. Final report for AFOSR Contract 79-0111, Tempe, AZ: Arizona State University, Department of Industrial and Management Systems Engineering, 1980.

Performance prediction equations for Air Force maintenance squadrons are generated through a step-wise, multiple regression analysis. Two basic dependent variables are specified--technician performance rate (speed of work) and performance accuracy (quality of work)-- measured by means of ratings. The model integrates 48 predictor variables related to performance, organizational structure, job tasks, and personal characteristics. Three independent survey instruments were designed and administered to samples of up to 180 maintenance technicians at each of two Arizona Air Force bases (Williams AFB and Luke AFB) using a 150 question survey instrument. The model provides predictions of squadron performance effectiveness while highlighting significant factors which contribute to maintenance effectiveness.

4.2. Performance Appraisal/Performance Measurement

206 Armstrong, G., & Dougherty, P. A study of the development of output measures. SLSR-24-71A, AD-887 487. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1971.

The objectives of this thesis were to determine the current status of the Air Force output measurement programs, to develop responsibility center output measurement selection criteria, and to develop and test a selected responsibility center output measure. Some of the conclusions are (a) the Air Force output measurement programs have received excellent direction and support from the Office of the Assistant Secretary of Defense (Comptroller); (b) the Air Training Command has been primarily responsible for developing the concepts and procedures used by the Air Force in implementing its output measurement programs; (c) the criteria required and used for the selection of cost center output measures are not sufficiently inclusive for use at the responsibility center level; and (d) the classifications of output measurement information are stratified in relation to the level of responsibility center/cost center management.

207 Borman, W. C. The rating of individuals in organizations: An alternate approach. Organizational Behavior and Human Performance, 1974, 12 (1), 105-124.

The author shows that raters at different levels in organizations perceive different dimensions of the ratee's job performance. Secretaries were asked to develop performance rating dimensions for their jobs. These dimensions showed only modest conceptual similarity with the job behavior dimensions developed for the secretaries by their bosses. In addition, inter-rater agreement on ratings was good within levels but not between levels. The author recommends procedures for use by organizations to deal with this problem.

208 Edwards, S. A., & McCarrey, M. W., Measuring the performance of researchers, Research Management, 1973, XVI (1), 34-41.

A review of measures of scientific performance which concludes that no single criterion is sufficient. Discusses the strengths and weaknesses associated with criteria of written output, quality and creativity.

209 Gersel, J. M. A method for measurement and analysis of supervisory work. The Journal of Industrial Engineering, 1968, 19 (4), 175-185.

Measurement of a supervisor's job has always presented a challenge to those interested in performance or productivity measurement. This study focuses on supervisory performance defined as the argument between the actual allocation of supervisory time on various tasks and standard times derived from a manager's view of the "ideal" allocation of time on the same tasks. Actual times are developed through observation and work sampling. No measures of outputs or accomplishments are used. The approach should improve communication between management/aids and lead to better clarity regarding the supervisor's role. However, the lack of focus on results is a weakness.

210 Hinrichs, J. R., & Haanpera, S. Reliability of measurement in situational exercises: An assessment of the assessment center method. Personnel Psychology, 1976, 29 (1), 31-40.

The authors performed reliability and validity analyses of assessment center ratings using the same set of situational exercises in eight different branches of a large manufacturing company. The study shows that this performance appraisal technique needs tuning up. For example, some dimensions of behavior were shown not to be significantly measurable in some exercises meant to reveal them. Other validity/reliability problems are diagnosed and discussed.

211 Hurst, E. G. Attributes of performance measures, Public Productivity Review, 1980, 4(1), 43-50.

The author assumes that productivity measures for an organization result from combining performance measures for organizational sub-units. Performance measurement can pose both technical and political problems. This article lists and discusses nine characteristics of good performance measures. Following this discussion is a section which addresses tradeoffs that must be considered in choosing or developing performance measures since some of the desirable attributes are mutually exclusive.

212 Improvement output measurement. LD 18755. Washington, DC: Office of the Comptroller of the Army, 1968.

This special study was initiated as a result of actions in 1966 by the Secretary of Defense to improve financial management systems, and his specific requirement in March 1967 to give particular emphasis to "development of improved ways to measure output." This document contains results of the initial effort to study improvements possible in measurement of output of Army units for use in the formulation of programs, the determination of resource requirements, the supervision of activities and functions, and the evaluation of performance and accomplishment. The initial study, using a combat-type unit as a vehicle, enlarged understanding of the output measurement concept, developed a structure for continued progress in this area, and prepared a comprehensive plan for implementation.

213 Latham, G. P., Fay, C. H., & Saari, L. M. The development of behavioral observation scales for appraising the performance of foremen. Personnel Psychology, 1979, 32 (2), 299-311.

The authors propose an improvement to the method for developing behavioral expectation scales. In this method, item or factor analysis is conducted to select the most discriminating items. Also, each item is dealt with separately by the rater, rather than having items grouped into scales. Techniques such as this can be used in a productivity improvement program to facilitate communication about expectations.

214 Letzkus, W. An analysis of the impact of planning-programming-budgeting on the Air Force Operating Manager. AFIT-TR-73-2. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1973.

Reports the results of a research project to assess the barriers against and the incentives for implementation of performance measures as perceived by Air Force managers. The report includes a comprehensive discussion of the issues involved in performance measurement, e.g., single vs. multiple measures, effect of measures on managerial behavior, efficiency vs. effectiveness measures. The data gathered from a sample of over 200 managers provides considerable insight into the characteristics that an operational system should have in order to be acceptable to Air Force managers. In general, the results found higher level managers and operational unit commanders to be less receptive to having their performance judged by performance measures than were lower level officers and support unit commanders.

215 Measuring engineering efficiency. Chemical Engineering. December 24, 1962, pp. 91-92.

Measuring the performance of engineering personnel is a knotty problem. This article describes a controversial method called PACE (performance and cost evaluation) used by a number of industrial firms. The approach is a form of work sampling and evaluates the ratio of people actually "working" to the number of people assigned to a work area. It has generated considerable resistance by engineers who consider it simply "spying" and who resent the rating judgements of "idleness" and "effort" required by the formula. An aerospace firm representative, however, was quoted as saying that the pla- saved them in a year over four million dollars. Such an estimate would seem to be inflated.

216 Meyer, H. H. The annual performance review discussion: Making it constructive. Personnel Journal, 1977, 56 (10), 508-511.

The author gives the objectives of performance appraisal (PA) as first to provide an inventory of human resource talent in the organization, and second to motivate employees. He then shows why standard PA practices do not accomplish these ends. He proposes a new design which (a) reduces the authoritarianism of the setting, (b) provides for upward communication, (c) minimizes threats to self-esteem of the ratee, and (d) accepts reasonable limits for what can be accomplished in one interview. The author tested his design in a controlled situation and documented the favorable results of using this technique.

217 Monczka, R. M., & Carter, P. L. Measuring purchasing performance. Management Review, 1978, 67 (6), 27-28; 38-42.

Based on a survey of procurement departments in 18 leading corporate and federal organizations that included 248 interviews with purchasing managers and buyers, some 13 categories of purchasing performance measures were identified. The most important and extensively used categories were price effectiveness, workload, cost savings, administrative control, vendor quality and delivery, and material flow control. Other lesser used categories included efficiency, social responsibility, procurement planning and research, competitive inventory, transportation, and purchasing procedure audits.

218 Patz, A. L. Performance appraisal: Useful but still resisted. Harvard Business Review, 1975, 53 (3), 74-80.

The author lists and describes systematic barriers (collection and analysis obstacles) and behavioral barriers (political and interpersonal obstacles) to the effectiveness of performance appraisal (PA) techniques. These items were uncovered by a survey of 38 top and middle managers in 19 companies. Since none of the companies wanted to stop doing performance appraisal despite barriers to effectiveness, the author presents four basic steps for getting PA to do what it is supposed to do, i.e., link behavior with results. These four steps are (a) keep it simple, (b) keep it separate, (c) keep it contained, and (d) keep it participative.

219 Schneier, C. E., & Beatty, R. W. Combining BARS and MBO: Using an appraisal system to diagnose performance problems. The Personnel Administrator, 1979, 24, 51-60.

Third article of a three-part series that combines the attractive characteristics of behaviorally based (BARS) and effectiveness based (MBO) appraisal systems into a managerial process that can enhance performance management. An informative integrative analysis is presented along with a data collection instrument, two examples of integrated MBO/BARS performance appraisals, and a six-step implementation procedure. An MBO/BARS appraisal permits the assessment of performance and productivity from low to high across these two vital measurement dimensions-- behavior (human actions) and effectiveness (results achieved), which is not possible using either system alone. BARS and MBO are indeed compatible and can be integrated successfully although it is difficult, complex, time consuming, and relatively costly.

220 Smith, J., et al. Handbook of job proficiency criteria: A GLAC research report. (NTIS No. PB-233 056) Columbus, OH: Ohio Department of State Personnel, July 1973.

This report lists and critiques many types of criterion measures which can be applied to employee performance, for example, simulated performance measures, employee comparison systems, and behaviorally anchored rating scales. The report includes instructions for the development of such measures. These instructions are limited to discussion of statistical techniques applicable to all types of measures. The report also includes the results of a survey of current measurement practices by government personnel offices.

221 Stahl, M. J., & Steger, J. A. Improving R&D productivity - Measuring innovation and productivity - A peer rating approach. Research Management, 1977, XX (1), 35-38.

Distinguishes between the concepts of productivity (quality of output) and innovation (output that is original and useful) and describes a peer rating approach to assessing both.

222 Tyler, G., & Hastorf, C. PRODME: Productivity measurement for patrol officer within a city police department. Public Productivity Review, 1979, 3 (3), 51-66.

PRODME is an internal police management tool for assessing the performance of individual police officers. It was developed and utilized as a means of measuring the full range of police functions and of providing data that could be used to identify and detect outstanding performers. The basic feature of the system is a listing of various activities and a weighting of the activities in terms of point value. Each police officer reports on a daily log the activities performed that day. Then, daily reports are turned in to the team leader. Monthly, the points are totalled by multiplying the number of each type of activity accomplished by its point value and summing across activities. The top five performers are given public recognition and each officer's score is given in relation to all others. During the project period of 5 months, the point totals increased every month.

223 Whitley, R., & Frost, P. The measurement of performance in research, Human Relations, 1971, 24 (2), 161-178.

The authors present indices of performance proposed by social scientists to measure the output of R&D laboratories and suggest promising approaches for developing better measures. According to the authors, the basic problem in measuring research performance is not primarily the development of measurement technology, but that of developing a coherent theoretical framework that will indicate what should be measured. A three-dimensional scheme is proposed for classifying existing performance measures: objective vs. subjective, dealing with basic vs. applied research, and applied to individuals or organizations.

4.3. Efficiency Measurement

224 AGMC operating productivity program. LD 34522AX. Newark Air Force Station, Newark, OH: Aerospace Guidance and Metrology Center, 1978.

The objectives of this study were to establish output measures and productivity indices for each organization funded under the operating budget and to systematically identify and resolve productivity problems in the areas of physical and humal resources.

225 American Productivity Center. Measuring productivity at United Airlines. Unpublished paper. Houston, TX: American Productivity Center, undated.

Provides a case study of the integrated productivity measurement program in an airline company. Discusses role of productivity measurement in overall financial reporting process. Provides examples of the benefits of productivity measurement and examples of criteria used.

226 Ardolini, C., & Hohenstein, J. Measuring productivity in the Federal Government. Monthly Labor Review, 1974, 97 (11), 13-20.

The authors, from the Division of Industry Productivity Studies, Bureau of Labor Statistics, discuss the 1967-1972 Federal government productivity measurement effort. They describe the program's background, concepts, trends discovered, measurement problems, and the future of this momentous effort.

227 Auffrey, L. Contracting productivity measurement system. Maxwell AFB, AL: Report No. 0100-78, LD 44601 A. Air Command and Staff College, Air University, 1979.

The measurement of productivity within a contracting organization requires the development of a system which integrates the results and standards, indices and trend data. The basic purpose behind such a system is to identify task activities which can be increased or decreased. To do this, key performance indicators must be identified, data gathered and analyzed. The contracting productivity measurement system (CPMS) developed in this paper provides the contracting manager with key indicators which must be analyzed in order to assess the overall productivity of the contracting organization.

228 Barbour, G. P. The challenge of productivity diversity: Improving local government productivity measurement and evaluation, Part IV: Procedures for identifying and evaluating innovations: Six case studies. PB 223-118. Washington, DC: Urban Institute, 1972.

Discusses a methodology for identifying and evaluating productivity enhancement efforts and for selecting from these innovations "models" for case studies. Emphasizes the need for evaluation of technological changes since not all new technology enhances productivity. Promoting wasteful changes simply increases waste. The study provides relatively little guidance to those interested in the "how to" of productivity measurement as this is covered in Parts II and III. Useful outlines are provided for Innovation Evaluation, Case Study Selection Evaluation and desired evaluation data.

229 Baumgartel, G., & Johnson, T. Productivity measurement in a base level USAF civil engineering organization. LSSR 17-79A, AD-A073 017. Wright-Patterson AFB, OH: Air Force Institute of Technology, 1979.

The objective of this study was to determine whether a model for measuring the productivity of a base level USAF civil engineering organization could be developed. A three-tiered model was developed and a literature review was conducted which identified input information for the model.

230 Cocks, D.L. The measurement of total factor productivity for a large U.S. manufacturing corporation. Business Economics, 1974, 9 (4), 7-20.

Measurement of total factor productivity is widely touted as being preferable to measures involving a single input - e.g., labor productivity. This article describes the application of a total factor measurement approach to a large corporation. Written from a macro economic viewpoint the approach is clearly described and sufficient examples are presented to assist the reader. An important characteristic of the approach is that it permits comparisons between the organization measured and all nonfinancial corporations as listed by the U. S. Department of Commerce publications.

231 Correia, C. A., & Kelseg, F. Measuring productivity in DARCOM's central procurement offices. AD A051516. Ft. Lee, VA: U.S. Army Procurement Research Office, 1978.

Describes the development of a productivity index for the procurement function that recognizes differences in the effort required to produce various procurement actions. The system also takes into account the procurement operations as well as the contract administration functions. A set of weights for outputs are developed based on a survey of experienced procurement specialists that permits a weighted summation of outputs. These weighted outputs are then related to both dollar and work-year inputs to derive the productivity index.

232 Craig, C. E., & Harris, R. C. Total productivity management at the firm level. Sloan Management Review, 1973, 14, pp. 13-29.

Management decision making involves making and evaluating various trade-offs: materials vs. labor, capital vs. labor, etc. The authors propose total productivity measurement as the best vehicle for the manager at the firm level to tie all aspects of the operation together and evaluate their effects. In a theoretical discussion, the authors cite the deficiencies of partial productivity measures and propose total productivity as the only satisfactory concept for management decision making. They then provide a conceptual model of the firm in service flow terms and translate this into a measurement model. Unlike financial ratios, this total productivity measure explains the efficiency with which the firm converts inputs to outputs, a more basic concept than profit.

233 DeiRossi, J.A. Measuring price and productivity change in the aircraft industry, RM-5805-PR, AD 706885. Santa Monica, CA: Rand Corporation, 1970.

An econometric analysis of price analysis methods which challenges the normal conception that price changes are a function of changes in input costs. This analysis argues that one must also consider productivity changes, substitution of input factors and output quality.

234 Earls, G. W. Productivity measurement. AD A026 714. Columbus, OH: Ohio State University Department of Industrial and Systems Engineering, Unpublished Masters Thesis, 1976.

Describes an iterative process among organizational representatives for the purpose of defining organizational concerns and performance in terms of productivity indicators. The intent is to create for the organization what might be called a management by productivity objective procedure rather than an output measurement system. There is a lengthy discussion defining productivity measurement suggesting that the Bureau of Labor Statistics measure is not applicable to career-oriented industries. Provides a linear input/output model to emphasize the complexity of decision-making in an organization made up of many sub-units. An actual exercise of the process to acquire meaningful productivity indicators is described as conducted for a base-level Air Force Civil Engineering unit.

235 Eisenberg, W. M. Measuring the productivity of non-financial corporations. Monthly Labor Review, 1974, 97 (11), 21-34.

The author describes a new statistical series on non-financial corporations, developed by the Bureau of Labor Statistics. The new series produces more uniform and consistent data (free of data anomalies present in proprietary and partnership situations), and shows how this important sector of the economy compares to the total private non-farm sector. Using the new index, changes in productivity, unit labor costs, and profits are discussed.

236 Epple, D., Fidler, E., & Goodman, P. Estimating economic consequences in organizational effectiveness experiments. Report for Office of Naval Research Contract N00014-75-C-0973, AD A038610. Pittsburgh, PA: Carnegie Mellon University, 1977.

The report describes a methodology for assessing one aspect of organizational effectiveness - productivity. The approach involves development of the production function stated as a multiple regression equation. Independent variables represent the output measure itself. Statistical tests are discussed for testing the hypothesis that a given organizational change experiment had on impact on productivity.

237 Felsinger, R. C. Productivity measurement and enhancement on U.S. Navy ships. LD 38053A. Monterey, CA: Masters Thesis, Naval Postgraduate School, 1976.

Describes a study of productivity on a sample of 26 Navy ships. A model of productivity was developed which considered productivity (efficiency) to be the number of planned maintenance actions accomplished per person assigned. Based on actual data, a regression model was developed to predict number of completed actions on the basis of crew members on board. Actual performance compared with predicted performance permitted the authors to separate ships into high and low productivity groups and then search for distinguishing factors. Study does not attempt to operationally define readiness or link levels of output to combat readiness.

238 Gantz, M. E. Improving human productivity. Productivity Series Bulletin No. 4, U.S. Dept. of Commerce, Situation Report. Washington, DC: U.S. Government Printing Office, August, 1975.

Discusses history of productivity measurement and improvement program at a manufacturing firm. Describes the method for developing a single partial index of labor efficiency and using this index to set productivity goals that will allow the company to "afford" increased labor costs.

239 Gargiulo, G. R. Productivity analysis: Prerequisite to meaningful financial planning. Management Adviser, 1974, 11 (1), 23-29.

The author argues that detailed productivity analysis is an important, even necessary, part of financial planning. The illustrative case shows how one company uncovered an unnecessary expenditure of $150,000 per year by comparing productivity of two plants, using simple output-per-man-hour and labor standards measures.

240 Gold, B. Foundations of productivity analysis. Pittsburgh PA: University of Pittsburgh Press, 1955.

A basic treatment from the macro economic point of view of consideration involved in adjusting productivity measures for changes in input-output relationships. Points out that productivity analysis is necessary since changes in productivity in indices may not be immediately interpretable. This seems to apply particularly to aggregate measures of input or output.

241 Greenberg, L. A practical guide to productivity measurement. Washington, DC: Bureau of National Affairs, 1973.

Intended as a guide for plant level applications, this book provides basic working definitions and practical solutions to many productivity measurement questions. Some non-labor inputs are briefly discussed as are various Bureau of Labor Statistics productivity indices.

242 Hall, J. R. Factors related to local government use of performance measurement. Report under Contract H-216212. Washington, DC: U.S. Department of Housing and Urban Development, 1978.

Reports the results of an investigation of the experiences of 18 local governments with performance measurement. Substantive users of performance data are contrasted within frequent users in terms of the types of measures, sources of measures, staff, use of consultants, role of Federal Government, top management role problems encountered, etc. Findings include the suggestion that efficiency measures should be used in conjunction with effectiveness measures, and that participation and involvement of users leads to greater use of data. An appendix lists efficiency and effectiveness measures identified across functional areas.

243 Hamlin, J. L. Productivity appraisal in the maintenance function. San Antonio, TX. Paper presented at the Annual Meeting of the National Petroleum Refiners Association, March 1979.

Provides an overview of the Productivity Appraisal process and illustrates its application to the maintenance function. Each maintenance functional area is covered (e.g. planning, manpower, equipment, materials, cost control/measurement/analysis) and specific productivity improvement characteristics are proposed.

244 Hatry, H. Wrestling with police crime control productivity measurement. Nation's Cities, 1975, 13, pp. 27-29.

Productivity measurement has many uses. It can tell police departments how they are doing, when they have problems, and whether they are making any progress in eliminating those problems. In this article the author discusses the present status of police productivity measurement and suggests seven ways that existing measurement methods may be improved.

245 Hatry, H., & Fisk, D. M. The challenge of productivity diversity: Improving local government productivity measurement and evaluation Part 1: Overall summary and recommendations. PB 223-115. Washington, DC: The Urban Institute, 1972.

Summarizes the recommendations of a major national study of local government productivity measurement in solid waste collection and police crime control. The study also addresses a methodology for locating and evaluating productivity enhancing initiatives in local governments. For details regarding either of these topic areas one should read the individual reports, Parts II-IV respectively.

246 Hetherington, R. Contracting productivity measurement at base level. Report No. 771103, LD 42476 A. Gunter Air Force Station, AL: Air Force Logistics Management Center, 1979.

The objective of this project was to develop a list of productivity measures which would provide base level contracting managers with relevant information to periodically evaluate the productivity within their organization. These measures can only alert management to undesirable conditions and do not pinpoint the cause of the condition. They are not the only information needed to manage a base contracting office. Productivity was defined in this study as the efficient use of resources to meet contracting requirements and goals. The evaluation of available human resources was the only measurement of efficiency proposed since the efficiency of the use of these resources is most easily influenced by base level management decisions. Proposed measures of productivity are grouped into the following achievement categories: office efficiency, quality of buy, timeliness of support, price paid, and economic program support. The author concludes that there is a need to measure both the efficiency and the effectiveness of the work performed by the base contracting office, because there is a natural dichotomy between the two. Attempts to maximize either will adversely affect the other.

247 Hirsch, G., & Riccio, L. Measuring and improving the productivity of police patrol. Journal of Police Science and Administration, 1974, 2 (2), 169-184.

This article presents an incisive analysis of the use of productivity measurement in police patrol operations. Beginning with a discussion of the differences between productivity measurement, efficiency and effectiveness measurement and quality measurement, the authors then demonstrate how these measures can be used for management control purposes. Examples are given of productivity measures for the police sub-function of apprehension of offenders. Measures are described which provide for type of data needed to assist managers in determining whether there is a problem, detecting the cause of the problem and suggesting courses of action to solve the problem. A number of police productivity enhancement programs are briefly noted, such as civilianization, transferring functions to non-police agencies, automation of clerical functions, reducing court time, and reduction of vehicle downtime.

248 Improving productivity: A self-audit and guide for Federal Executives and Managers. Washington, DC: National Center for Productivity and Quality of Working Life.

This report is a "how to" manual for Federal Managers in the basics of productivity measurement and analysis. It covers the topics of efficiency and effectiveness measurement and leads managers through a step-by-step analysis of their operations. Careful study and application of this publication will provide an excellent start for anyone interested in improving the productivity of their organization whether governmental (its intended audience) or private sector.

249 Improving Productivity Through Industry and Company Measurement. Washington DC: National Center for Productivity and Quality of Working Life, 1976.

Summarizes the proceedings of a conference focusing on productivity measurement in industry. Papers dealt with measurement techniques and data, examples of company and industry-wide measurement and research in productivity measurement.

250 Johnson, F. B., et al. Mason productivity study, Volume III: Measurement of productivity. PB-221 717. Austin, TX: University of Texas, 1973.

Under carefully designed and controlled experimental conditions, masons built walls. Production was compared across a number of conditions, including various brick, block and tile shapes and sizes; scaffolding types; and laying techniques. Some clear relationships were established and some promising techniques for productivity improvement were documented including mechanical aids and surface bonding.

251 Katzen, R. Measuring the productivity of engineers. Chemical Engineering Progress, 1975, 71 (4), 24-28.

Since measuring outputs of engineers is generally conceded to be too difficult, this article describes an approach to measuring the efficiency and effectiveness with which engineers spend their time. The system is very difficult to understand. It is unclear whether it is a self-report system or rests on supervisory ratings. Effectiveness refers to the proportion of working hours spent on defined projects. Efficiency is the percentage of effective hours which are fully productive. These measures are computed and graphed monthly. At best, they permit a crude assessment of trends in time utilization and assignment of work.

252 Kendrick, J. W. Summary and evaluation of recent work in measuring the productivity of federal agencies. AD-618705. Paper presented at Department of Defense Logistics Research Conference, May 1965.

This paper discusses the nature and meaning of productivity index numbers and their applicability to Federal Government organizations. Examples of this applicability of productivity measures are provided for five Federal civilian agencies. The author concludes that the techniques could profitably be spread to other civilian agencies and to some DOD functions. Kendrick feels that DOD measurement should remain unconsolidated at the Department level until the problem of defining and measuring final defense services is solved.

253 Lando, M. Measuring productivity in the U.S. ship building industry. Report for ONR contract N00014-69-A-0091. AD-712462. Arlington, VA: Center for Naval Analyses, 1970.

Develops measures of efficiency for U.S. Naval ship building during the period 1958-1966, and compares and evaluates the various measures. Concludes that the preferred index is a measure of real value added divided by the index of man-hours for all employees.

254 Litton Systems, Incorporated. Productivity measurement mode. PRR-69-5, final report of Contract N00022-69-0-0076, AD-698-127. Monterey, CA: Bureau of Naval Personnel, May 1969.

Discusses the development of a productivity measurement model using available data for a Naval Air Training Command. The approach is pragmatic in that it takes into account those factors in a military environment that make an ideal model impractical and too expensive. The model makes use of a single output measure for each sub-cost center. It also includes a brief but useful discussion of the problems associated with horizontal productivity comparisons and aggregation to higher levels.

255 Litton Systems, Inc. Productivity measurement model: User's manual (PRR-70-2). Interim report for Bureau of Naval Personnel Contract N00022-69-C-0076, AD-698129. Monterey, CA: Mellonics Systems Development Division, July.

Provides operational instructions and flow charts of the computer programs associated with the productivity measurement model. Of particular interest is the structure of the model and the operational definitions of productivity measures used in the model.

256 Litton Systems, Inc. Application and demonstration of NAS Saufley manpower allocation and productivity measurement model, PRR-70-7. Final report for Bureau of Naval Personnel Contract N00022-69-C-0100, AD-701 303. Monterey, CA: Mellonics Systems Development Division, January 1970.

This report discusses the try-out of a productivity measurement model at the cost center level developed as a tool for justifying manpower requirements at Naval Shore activities. It provides evidence that a mathematical model can respond to a variety of manning and budgetary questions posed by Navy management. The approach was designed to be compatible with the Program Planning and Budgeting System.

257 Mark, J. A., & Ardolini, C. W. Developments in measuring productivity in the federal sector. American Statistical Association. Proceedings of the Business and Economics Statistics Section, 1974, pp. 236-245.

The authors, from the Bureau of Labor Statistics, discuss the productivity measurement effort undertaken in the Federal government between 1967 and 1972. The conclusions are (a) an average 1.9% per year productivity gain occurred over the 5 studied years, and (b) broken into 16 functional groups, average annual changes ranged from 2.4% to 5.8%. Some effort is made to account for the differences.

Mayotte, R. Comparison of the output in weighted work units of installation dental laboratories with that of regional dental activities. Report No. DA 723031, I.D 40568AX. Ft. Sam Houston, TX: Academy of Health Sciences, 1978.

The objective of this study was to determine the productivity of dental laboratories which are located in and are an integral part of installation dental services; to determine the actual utilization of dental laboratory technicians at the local installations; to identify the local or regional dental activity (RDA) which is more productive in terms of output per available dental laboratory technician; and to develop an improved installation dental laboratory management index.

259 Mazzola, D. P., & Kaufman, J. D. Activity measurement program promotes productivity. Industrial Engineering, Series No. 4, June 1978, pp. 26-30.

An internal, computerized, management reporting and control system is developed for a hospital to accurately measure and track productivity. The activity measurement program (AMP) uses weighted units per direct manhour as the overall indicator of departmental productivity and resource management performance. Regular monthly AMP reports show relationships among activity, manhours, labor costs, and revenues along with departmental AMP control graphs indicating how a given productivity indicator changes with time. Each department head and administrator receives copies of the reports and graphs, interprets the effectiveness of last months's resource management and productivity efforts, and initiates corrective action as needed.

260 McDonald, B. The measurement of economic efficiency in the defense aerospace industry. XRR, LD 36292 A. Kirtland AFB, NM: Contract Management Division, 1975.

This study explores a methodology to measure the economic efficiency of the 20 aerospace contractors over which the Air Force Contract Management Division (AFCMD), Kirtland Air Force Base has cognizance for contract administration. Efficiency measures are developed for a point in time (1974) and can be used to compare the relative efficiency of the contractors. The usefulness of this methodology, however, can be expanded by its application to time series data, allowing the tracking of an individual contractor's efficiency over time. The technique used to derive the efficiency measures is a linear programming estimate of an economic production function for the sample. The estimated production function establishes a potential output for each contractor. The efficiency measure is the simple ratio of actual to potential output. Data used in the estimation procedure include value added for output, total labor hours for labor input, and either total square footage of plant or acquisition cost of capital, adjusted for utilization, for capital input. All data are for the contractors' 1974 fiscal year and include both government and commercial work. The author concludes that efficiency measures complement AFCMD's contractor management systems evaluation program by providing an assessment of another dimension of a contractor's management and a measure of efficiency improvement over time. A second conclusion is that measures contractor efficiency can also serve as another variable in AFCMD manpower allocation decisions. A final conclusion is that the efficiency measures, when estimated in the future, will provide a method to measure the results of the collective efforts of both industry and government to improve productivity in the defense aerospace industry.

261 Measuring Productivity in Physical Distribution. Chicago, IL: The National Council of Physical Distribution Management, 1978.

This comprehensive study of physical distribution (logistics) addresses the problems of measuring productivity in the areas of transportation, warehousing, purchasing, inventory management, production management and physical distribution administration. Extensive examples are given as well as suggestions on how to tie the measurement system to productivity improvement.

262 Measuring productivity of indirect labor associated with manufacturing activities at I.B.M. Case Study (unpublished). Houston, TX: American Productivity.

Describes a method used by a major corporation to obtain a crude index of the productivity of indirect labor activities. The method breaks down functions into 160 activity areas (e.g. purchasing-expediting, purchasing-buying) each of which has a single indicator (e.g. number dollars purchased, number invoices, shipping dollars). Productivity ratios are then computed which are the number of people in an activity per unit of indicator. These can be compared across locations and across time.

263 Merrell, P., & Kumar, T. K. Productivity measurement in administrative services: Budgeting and management analysis in public service institutions, Report AAI-77-56 Abt Associates, Inc., Research grant APR-75-20504, The National Science Foundation, Washington, DC, June 1977.

This report deals with the development of a theory for measuring administrative productivity which is relevant to public institutions. The authors conclude that a conventional input-output approach is not feasible. Subdividing administrative functions into components is not likely to produce meaningful results. Data collection and control are also not feasible. A lengthy discussion on the problems of external regulations and necessary reporting is prepared in the context of productivity. The report concludes with development of a measurement technique which satisfies the following criteria: (a) must generate measurements expressed in terms of the marginal product, (b) take into account factors which create demand for administrative labor, and (c) be based on cross-sectional data.

264 Morris, T. D. Joint study shows productivity gains. Defense Management Journal, 1972, 8 (3), 16-20,87.

The author, Assistant Comptroller General, reports that data voluntarily contributed by 55% of all civilian government employees show that a labor productivity gain of 7.7% occurred between 1967 and 1971. The article also describes the basis for this measurement and gives some breakdowns by work group.

265 Morris, T. D., Corbett, W. H., & Usilaner, B. C. Productivity measures in the Federal Government. Public Administration Review, 1972, 32 (6), 753-763.

This article traces Federal Government productivity measurement efforts back to 1962. It goes into detail about the 1967-1972 effort, describing how cooperation was obtained from the 17 participating agencies, how data were interpreted, and future directions for continuing attention to the problem of productivity improvement.

266 Moundaletis, J., & Kovalick, P. N. Feasibility of measuring Federal Aviation Administration productivity. AS 728 910. Washington, DC: Federal Aviation Administration, 1967.

Discusses a system for measuring productivity at the agency level. The report concludes that an agency-wide measurement system is technically feasible but requires extensive preliminary work and that the possibility of developing a single agency measure is slight and a more logical approach would be to develop a composite index of many measures, each representing a specific mission component. Includes an appendix with a useful discussion of productivity measurement theory.

267 Newburn, R.M. Measuring productivity in organizations with unquantifiable end products. Personnel Journal, 1972, 51 (9), 655-657.

Describes three approaches to measuring productivity in organizations whose products are not quantifiable. The approaches discussed are quantification of functions (vouchers/ employees), work sampling and subjective ratings. The discussion is rather general.

268 Norman, R. G., & Bahir, S. Productivity measurement and incentives. London, England: The Butterworth Group, 1972.

An engineering perspective on the role of productivity measurement at the plant level. Assuming that measures are needed to highlight ineffectiveness in organizations, the authors critique various approaches to productivity measurement, describe an operational approach to measuring inter-firm productivity and discuss the contributions and limitations of work measurement and productivity bargaining as productivity enhancement methods.

269 Ohio State Productivity Research Group. Productivity measurement systems for administrative computing and information services: An executive summary. NSF Grant No. APR 75-20561. Columbus, OH: Ohio State Research Foundation, 1975.

Describes the development of a productivity measurement system for administrative computing and information services. The goal of the approach was a system that was multidimensional, included measures of both efficiency and effectiveness, and reflected views of three constituencies; providers of ACI services, user agencies, and top managers with responsibility for long range planning. The methodologies used were based on group participation (Nominal Group Technique and Delphi Method). Report lists the criteria and indices generated.

270 O'Neill, M. E>, & Unwin, E. A. Productivity measurement: A challenge for implementation. Public Productivity Review, 1977, II (4), 27-37.

Provides a very global model to conceptualize productivity in public service organizations and gives an outline of a three-day seminar on productivity measurement and improvement.

271 Parker, W., & Barnes, G. Productivity of USAMEDD dental laboratory technicians. 77-02, AD-A041 032. Ft. Sam Houston, TX: Academy of Health Sciences, 1977.

The purposes of this study were to determine if the dental workload accounting system used in the regional dental activity (RDA) system is useful at the installation level, and to provide data for determining if the resultant output is potentially useful as a management tool. Data collection of input, procedures accomplished (output), and daily assigned personnel strength was conducted at the medical center (MEDCEN) and three medical department activities (MEDDAC) dental services.

272 Ross, J. P., & Burkhead, J. Productivity in the local government sector. Lexington, MA: Lexington Books, D.C. Heath and Co., 1974.

This book ambitiously and thoroughly examines concepts, rationale and techniques of productivity measurement in government. It evaluates measures used in prior studies and draws the distinction between "object function" (consequence) measures and direct output measures. The authors recommend a methodology which attributes changes in inputs to changes in either workload or cost. Generally this leaves a residual which must be examined to see if quality has gone up (requiring the additional expenditure) or productivity has gone down (more resources do the same job).

273 Ruch, W. A. (Ed.). Proceedings of the Grantee's conference on research on productivity measurement system for administrative services. Final report for NSF Grant APR 76-83866. Tempe, AZ: Arizona State University, College of Business and Management, 1977.

Describes progress reports for efforts to enhance the productivity of services in both the public and private sectors. Services discussed are purchasing, materials management services, computing and information services, inspection and quality control administration, and budget and management control functions. Excellent bibliographies are included in the report.

274 Sadler, G. "Quickie" industry productivity measures (Based on Existing Published Material) Unpublished Manuscripts. Houston, TX: American Productivity Center, undated.

Describes a mechanism and methodology for using data from the U.S. Census' Annual Survey of Manufacturers to generate industry and plant-level productivity indices. Also focuses on some of the cautions that should be followed in using this data.

275 Schaenman, P., & Swartz, J. Measuring fire protection productivity in local government: Some initial thoughts. Boston, MA: National Fire Protection Association, 1974.

This monograph examines the problems inherent in measuring the efficiency and effectiveness of fire suppression and fire prev tion. It describes in clear terms how to develop measures of input, output and how to use the resulting productivity measures in conducting productivity analyses. The approach described can be generalized to areas other than fire protection.

276 Scheppach, R. C., Woehlcke, L., & Faucett, J. G., Use of productivity measures in transportation policy making and regulation. PB223703. Chevy Chase, Maryland: Jack Faucett Association, Inc., 1973.

Discusses the role of productivity measures in policy decisions in general and in the transportation industry in particular. The report offers useful basic information on an economic approach to productivity measurement. The two principal applications discussed are rate adjustment in a regulated industry and establishing guidelines for wage increases.

227 Sears, L., Shelby, L., & Lederman, A. Measuring efficiency and effectiveness in Army material command depots and MSCs. Washington, DC: Defense Economic Analysis Council, 1973.

This document is a condensation of a presentation to the Benefit/Output Mini-Symposium on 28 November 1973 by the Comptroller, Army Material Command (AMC). This paper was intended to explain the AMC distinction between efficiency and effectiveness measurement; to describe efficiency and effectiveness measurement; and to show how AMC compares efficiency scores between like activities, and then how these scores are used for analytical purposes. Finally, the results of the efficiency and effectiveness yardsticks were merged into one composite index.

278 SESA productivity measurement system. Final report to the Manpower Administration, U.S. Dept. of Labor under contract No. 20-1-75-47, PB 264 417. Vienna, VA: Analytic Systems Division, 1976.

Describes the development of a productivity measurement system for the State Employment Service Agencies. This report is particularly interesting as an example of the application of productivity measurement techniques to a service organization. It discusses the definition of outputs and methods for quantifying outputs and weighting them to arrive at an overall measure of the productivity of the agency.

279 Shannon, C., & Hanson, R. Towards improving police patrol productivity: A method for the identification and selection of performance standards. Public Productivity Review, 1979, 3 (3), 67-74.

A theoretical article addressing the relationships between indicators of efficiency and effectiveness. The author points out that efforts to improve the effectiveness of police services must demonstrate efficiency improvements prior to effectiveness change in order to argue for a causal linkage.

280 Shelby, W. L. Productivity measurement: A new managerial concept for the military. Unpublished report 75-2, AD-A027287. Ft. Belvoir, VA: Defense Systems management school, 1975.

Report describes an efficiency-effectiveness measurement system for improving military organizations. The system operation is described in the context of a productivity cycle with three components: measurement, management awareness, and productivity improvement. The discussion provides simple and lucid examples which illustrate each of the three facets of the cycle. It concludes with the recommendation that productivity measurement be extended beyond its current applications. This report provides a good foundation for those interested in understanding the meaning and application of productivity measurement in any organization.

281 Sherrard, W. R. Labor productivity for the firm: A case study. Quarterly Review of Economics and Business, 1967, 7 (1), 49-61.

A case history of labor productivity in a Pacific Northwest lumber mill for the years 1903-1938. Detailed examination of the firm's personnel and payroll records, physical outputs, capital inputs, and material inputs provides insight into changes in the firm's labor productivity, the effect of log size on labor productivity, a comparison between changes in labor productivity and changes in level of output, and the relationship between capital employed and labor productivity. These relationshiops are analyzed in detail after calculating coefficients of determination for the above variables with output per work-hour as the labor productivity measure for the total plant and five separate mills. Productivity implications are developed relative to the lumber industry in the United States, and the importance of the study to management and economic historians is noted.

282 Siegel, I. H. On company productivity measurement: Why, what, how. Productivity Series Bulletin No. 6, U.S. Dept. of Commerce, Situation Report Washington, DC: U.S. Government Printing Office, August 1975.

Discusses the benefits for a company in measuring productivity, definition of the concept, and five steps that a productivity measurement program should follow: (a) determine elements of the organization to be monitored, (b) select preferred units of output and input that are critical to the organization as a whole and its sub-activities, (c) ascertain availability of data, (d) choose weights, combining formula and index numbers, and (e) constantly revise and update measures.

283 Staats, E. B. Measuring and enhancing federal productivity. Conference Board Record. 1973, 10, pp. 53-56.

The author, Comptroller General in 1973, discusses the productivity measurement project applied to voluntarily submitted data during FY 67 to FY 72. These data applied to 60% of civilian work-years in 1972. Mr. Staats discusses reasons for trends, including capital investment on the improvement side and arbitrary personnel cuts and ceilings on the negative side.

284 Stewart, W. T. A "yardstick" for measuring productivity. Industrial Engineering, 1978, 10 (2), 34-37.

The author describes the development of a multiplicative multi-attribute utility measure of productivity using a structured group process. The resulting measure can be used in aggregated form to represent overall organizational productivity or in a disaggregated form to monitor individual factors. As long as the organization accepts the measure, this may be an excellent tool for complex, difficult-to-quantify situations.

285 Sullivan, R. J. Developing a measure of Marine Corps recruiting effectiveness. AD-A027232. Monterey, CA: Naval Postgraduate School, 1976.

Describes the development of a model of recruiting effectiveness based on the extent to which standards are achieved. Standards are developed using regression techniques and essentially predict the recruiting potential of an area based on 15 variables relating to community and high school characteristics. The study points out the weaknesses associated with use of meeting quotas as a criterion of recruiting effectiveness.

286 Trozzo, C.L. Productivity of defense RDT&E. Report for contract DAHC 15-676-0011, T-83, AD-734 386. Arlington, VA: Institute for Defense Analysis, 1971.

Discusses the feasibility of measuring the productivity of the military research, development, test, and evaluation (RDT&E) program. Provides a good discussion of the problems associated with defining and measuring outputs of RDT&E efforts as well as the weaknesses of existing output measures.

287 Udler, A. Productivity measurement of administrative services. Personnel Journal, 1978, 57 (12), 672-697.

Discusses a method for productivity measurement that makes use of work sampling. The system is applicable to functions when the outputs can be identified although the work may be diversified and creative (e.g., personnel). Use of the system leads to data on productivity, unit costs, labor distribution, and direct and indirect labor costs.

288 Udler, A. S. An experiment in the personnel office. Civil Service Journal, 1979, 19 (3), 32-35.

Describes the use of work sampling techniques to generate productivity indices for a personnel office. The article describes the work sampling procedure and presents results in terms of labor distributions for various personnel functions. Procedures are described for converting these data into unit labor costs, direct and indirect labor costs, and productivity indices. While the system appears relatively easy to implement, the work sampling period recommended spans 1 year which means that productivity data do not become available until year 2. The author briefly addresses a number of considerations that are important to any attempt to establish a productivity measurement system.

289 Wagman, B. L. An approach to measuring the productivity of staff functions. Public Personnel Management, 1974, 3 (5), 425-430.

In this article the author discusses some of the problems relating to the measurement of the productivity of staff functions. As he points out, part of the difficulty is the difficulty of establishing staff objectives. The methodology proposed involves starting with the objectives of the organization, defining homogeneous end products or outputs for each major function, aggregating these products and dividing the aggregated outputs by the appropriate inputs to yield the productivity measure. The author reviews recommendations of several experts in the field in developing his recommended approach.

290 Wearn, J. Productivity monitoring and measurement. Productivity Series Bulletin No. 5, U.S. Dept. of Commerce, Situation Report. Washington, DC: U.S. Government Printing Office, August, 1975.

Discusses some general principles to be observed in the establishment of a productivity monitoring system. Points out that more benefit is likely to occur from monitoring productivity of key departments and activities than from company-wide coverage. Generally discusses the need for total factor measures and some do's and don'ts for company measurement systems.

291 Zamarra, J. E., & Brousseau, L. A. A model for measuring productivity trends at Naval shore activities. NPRDC-72-9, Washington, DC: Navy Personnel Research and Development Center, June 1972.

Provides a rather basic explanation of productivity beginning with the classic production function. Development of a composite productivity index (CPI) is then described. The CPI is the sum from 1 to i of the products of the "ith" work center productivity index weighted by the ratio of the "ith" work center manpower to total activity manpower. The work center productivity index is the ratio of output to the output of a base period. There is little discussion given to the difficult task of measuring output of a service-type organization. Linearity is assumed in developing the forecasting algorithm. Not taken into account is the effect of technological change. The report does reaffirm use of productivity indices for comparative purposes.

4.4. Quality of Working Life Measurement

292 Glaser, E. M., & Greenberg, P. D. Quality of worklife programs: A preliminary technology assessment. Final report for NSF Grant No. ERS 77-06 495 A03. Los Angeles, CA: Human Interaction Research Institute, 1979.

This report describes three substudies concerned with Quality of Working Life (QWL) issues. These were (a) a comparison of QWL processes and outcomes in three manufacturing plants espousing a QWL philosophy and in comparison plants not espousing such a philosophy; (b) an effort to characterize the attitudes and roles of labor unions toward QWL; and (c) a survey of the impact of QWL on curricula in leading schools of business. Results for substudy one found that, in general, QWL plants outperformed non-QWL plants with respect to productivity, work related accidents/illness, and, in one case, with respect to unaccounted for inventory shrinkage. Absenteeism and turnover did not differ for the two groups of plants. Substudy two revealed considerable diversity of opinion toward QWL both positive and negative, among labor representatives. Finally substudy three found that only a small number of business schools accord QWL a central role while most provide some coverage of the concepts.

293 Herrick, N. Q. The Quality of work and its outcomes: Estimating potential increases in labor productivity. Columbus, OH: Academy for Contemporary Problems, September, 1975.

Outlines a system for estimating the dollar value of potential decreases in counterproductive labor activities. The principal hypothesis to be tested is that improved quality of work life results in measurable productivity increases. The report describes development of a questionnaire to assess characteristics in the workplace. Quality of work life is defined by four dimensions: security, equity, motivation, and participation. There is some discussion of an individual's need for participation. A procedure for recording observed data is provided. Counter-productive activities are defined and procedures for measuring and costing are described.

294 Mirvis, P. H., & Lawler, E. E. Measuring the financial impact of employee attitudes. Journal of Applied Psychology, 1977, 62 (1), 1-8.

The authors describe an approach to behavioral cost accounting and demonstrate its use in assessing the behavioral costs of bank tellers. The approach is based on the relationship between attitudes and future job behavior, e.g., absenteeism, turnover, and errors. This relationship was then used to predict the behavioral changes that could be expected to result from a .5 standard deviation change in attitudes. When behavioral changes were equated with dollars using cost accounting methods, the results show an expected direct cost savings of $17,664 through changes in absenteeism, turnover, and performance associated with a .5 standard deviation increase in job satisfaction. The article concludes with a critical analysis of the method and an assessment of its usefulness to organizations.

295 Seashore, S. Defining and measuring the quality of working life. In L. Davis & A. Cherns (Eds.), The quality of working life Vol. II. New York: The Free Press, 1975, 105-118.

Suggests that the usual concept of quality of working life as something like job satisfaction is unduly narrow and is too static. Proposes a concept of quality of working life which represents the dynamic nature of the concept and which treats job satisfaction as a cause as well as an output. A broader concept might be labeled "effectiveness in work roles." Effectiveness should be evaluated from three perspectives: (1) Employer-using criteria such as productivity, quality, cost per unit of output (2) Worker - earnings, security, satisfaction, safety, (3) Community or society - under-utilization of skills, costs of work stoppages, unemployment costs, tax base, welfare costs.

296 Task Force on Measurement, Appendix IV. In L. E. Davis, A. B. Cherns & Associates (Eds.), The quality of working life: Volume 2. New York, The Free Press, 1975.

Reports the results of a task force established to develop methods for measuring quality of working life. The objective of the task force was to develop measurement approaches that would have utility for policy making and assessment. The task force raised a number of questions regarding measurement, e.g., measurement for whom, feasibility, objectivity vs. subjectivity, past vs. future orientation. Some dimensions for which the task force recommended measures be developed included: employment conditions, employment security, income adequacy, equity, worker autonomy, social interaction, self-esteem, participation in decision making, and worker satisfaction.

297 Walton, R. Criteria for quality of working life. In L. Davis, et al. The quality of working life, Vol. 1. Problem, prospects and the state of the art. New York: The Free Press, 1975, 91-104.

Proposes eight conceptual categories that together define quality of working life. These categories are adequate and fair compensation, safe and healthy working conditions, immediate opportunity to use and develop human capacities, opportunity for continued growth and security, social integration in the work organization, constitutionalism in the work organization, work and total life space, the social relevance of work life.

4.5. Work Measurement

298 Bennewitz. E. Work measurement essential to resource management, Defense Management Journal, October 1972, pp. 30-35.

Describes the Army's involvement in the joint federal productivity measurement project begun in 1971. The office of primary responsibility in the Army was the Comptroller of the Army to allow the large amount of productivity data already collated in the programming and budget reports to be used to advantage. The Army adopted a "horizontal" approach to the productivity measurement program as opposed to the "vertical" approach of other agencies. The Army reported on 18 program elements which represented approximately 42 percent of the Operation and Maintenance, Army (OMA) Budget. Conclusions drawn from this experience were that valid performance measures can be found or developed, only limited use of performance measures is made at the installation level for day-to-day management, and performance trends should be frequently monitored as a regular part of the program and budget cycle.

299 Bryant, A., Shallman, W., & Brewer, D. Improving work measurement systems in the federal government. Rock Island, IL: U.S. Army Management Engineering Training Agency, June 1973.

Describes results of interviews with a number of Federal agencies that use successful work measurement programs. The effort reported was under direction of a joint OMB/GAO/CSC committee whose purpose is to improve government productivity. Findings, analysis, conclusions, and recommendations were reported for three major categories, one of a general nature, a second on development of work measurement standards, and the third on applying work measurement standards. The report does not address the actual development and application of work measurement systems, but is more general in nature. A companion report provides guidelines for managers. The survey data provided in this report is the basis for the companion report.

300 Bryant, A., Shallman, W., & Brewer, D. Work measurement guidelines for Federal Government managers. Rock Island, IL: U.S. Army Management Engineering Training Agency, June 1973.

Describes the relationship of efficiency and effectiveness measurement in developing a performance system. Efficiency is further categorized by work, unit cost, and productivity measurement. Each is described. Emphasis is on work measurement defined as time per unit of work. The need for work measurement data is discussed primarily in connection with the budget process. Procedures for establishment and maintenance of work measurement data are described. A description and characteristics of various work measurement techniques are provided.

301 Committee on Federal Laboratories, Federal Council for Science and Technology. Special studies of measurement problems Volume 1: Measuring research and development and grant administration programs. Washington, DC: Federal Council for Science and Technology, October 1973. (NTIS No. PB-246 170)

This publication deals separately with R&D and grant administration productivity measurement. Several possible approaches for measuring R&D productivity are examined but no recommendation is made. For grants administration, a "standard hour" type measuring system is developed and described.

302 Dudick, T. S. Rises in productivity. Management Adviser, 1972, 9, 19-24.

The author lists and explains four methods of measuring productivity for a manufacturing activity: sales basis, units of output, weighted units, and productivity trend control. The latter, which is based largely on standard times, is advocated. The microrelationship between volume and efficiency is discussed at some length. Conclusion: measuring productivity is not simple. Corrections must be made for confounding changes such as volume.

303 Dudley, N. A. Work measurement: Some research studies. London: MacMillan, 1968.

Reports on methodological research in the field of work measurement conducted in England. Includes research on compensating rest allowances, work time distribution, repetitive work and paced vs. unpaced performance.

304 Ferguson, E.J., et al. Development of manpower productivity measurements of street maintenance service by local governments. PB-252 348. Stillwater, OK: Oklahoma State University, February 1976.

This study, including a formal report and a users manual, applies industrial engineering procedures to the improvement of managerial controls in the street maintenance departments of small municipalities (pop. 25,000-1,000,000). While the authors hold that such procedures "improve operations," no specific numerical documentation is provided to support that position. The report includes implementation techniques which promise minimal disruption of existing procedures, and a system for evaluation of street conditions by citizens.

305 General Accounting Office. Improvements needed in Defense's efforts to use work measurement. LCD-76-401. Washington, DC: Comptroller General of the United States, 1976.

The GAO investigation of work measurement practices in the Department of Defense concluded that the program was not achieving its potential due to a lack of management support. Recommendations included increasing the coverage of work management throughout the services and providing more high-level management support. GAO expects that such action will increase labor productivity.

306 Hall, J. T., & Dixon, R. A. Productivity measurement in R&D: Productivity measurement experiment in selected research and development programs at the National Bureau of Standards. Washington, DC: National Bureau of Standards, Department of Commerce, 1976 .

The NBS Productivity Experiment, applied to R&D units, found no suitable proxy for impact, the true product of R&D efforts. However, the experiment uncovered some solvable organizational problems which limit productivity. The experiment included a work sampling study, a communications study, an output analysis, a "value analysis" (an approach to developing criteria for selection and evaluation of programs), construction of a rating system for evaluation of programs, and construction of a model of the R&D process.

307 Kennah, R. B. The measurement of procurement workload. AD-787 213. Wright-Patterson AFB, OH: Air Force Institute of Technology, Unpublished Masters Thesis, 1974.

Describes a method for measuring the workload in procurement, a complex, non-repetitive white-collar work environment. The methodology makes use of subjective estimates of the time to accomplish particular tasks. The approach leads to rather "crude" time standards; however, it has the advantages of acceptability, understandability, and is relatively inexpensive to develop and use. The workload measures developed were compatible with the existing management information system.

308 Klug R. H. Design and evaluation of a system for raising productivity through work measurement, Unpublished doctoral dissertation, Ohio State University, 1962.

Presents an evaluation of the Air Force work measurement program as applied to the Aircraft Repair and Maintenance and Supply functions. Study concluded that in the 10 years since initiation of the program, labor efficiency rose from 55 to 89 percent in maintenance and from 61 to 88 percent in supply. The study implies that these improvements are the result of the work measurement effort.

309 Mollenhoff, D. V. How to measure work by professionals. Management Review, 1977, 66 (11), 39-43.

The Deputy Secretary of the Department of Local Affairs and Development (DLAD) of the State of Wisconsin summarizes the development and implementation of a work measurement system based on sets of performance indicators for key result areas (KRAs) and refined productivity standards for knowledge workers (e.g., researchers, consultants, accountants, social workers). The management-by-objective (MBO) concept is applied within DLAD by subdividing KRAs into measurable units, rather than merely activities, and then using numerical goals, ratios, rating scale target scores, and performance ranges to reflect reasonable and achievable quantitative standards for productivity measurement. Four examples of professional work measurement are given along with their quantitative performance indicators.

310 Nassr, M. Productivity growth through work measurement. Defense Management Journal, April 1977, pp. 16-20.

Describes the development of MIL-STD-1567 which requires selected defense contractors involved in major development programs to adopt work measurement programs. This standard establishes criteria that such a work measurement program must meet. In general, it calls for (a) a documented work measurement system with a clear designation of the organization and responsible personnel, (b) a plan to establish and maintain standards of recognized accuracy, (c) a plan for the improvement of standards, and (d) a plan for the use of standards data in budget estimating and production planning.

311 Newburn, R. M. Measuring productivity in organizations with unquantifiable end-products. Personnel Journal, 1972, 51 (9), 655-657.

The author, a management analyst at the former Atomic Energy Commission, points out that productivity indices stimulate innovation and competition within an organization. Therefore even an imperfect measure is worth the effort as long as it stimulates these responses. He describes quantification of functions, work sampling, and performance appraisal, all of which are applicable when end products are not measurable.

312 Poedtke, C. H., Jr. Work measurement alone is not the answer. Management Adviser, January-February 1973, pp. 39-42.

The question addressed by this article is how to improve clerical productivity. The author proposes a three-pronged program that involves management training, systems analysis to insure that the methods and systems used are appropriate and then work measurement. No empirical data to support the approach are presented.

313 Poulin, P. Work measurement in management of paper-flow activities. Washington, DC: Ft. Lesley J. McNair, Industrial College of the Armed Forces, 1966.

A large and increasing segment of defense administrative and logistical effort is devoted to processing paperwork, data, and ideas as opposed to operational or industrial type functions. Measurement of productivity and establishment of performance standards is difficult, since tasks and products are varied, complex, and inconsistent in time and effort required for accomplishment. Past work measurement systems did not suit management needs. Review of management information requirements and current systems suggests that a useful and economical approach is through identification and analysis of continuing quantitative relationships between primary products and principal categories of effort, as opposed to conventional use of statistical and precise standards.

314 Shantz, C. E. What's that WP work station really doing? Administrative Management, 1976, 37 (3), 51-54.

The author discusses the issue of work measurement as applied to word processing. Traditionally the measure of output has been line counts. However, with the increased variety of work, the degree of difficulty of the work must be taken into consideration in setting valid standards. The author proposes a formula for measuring production rate which is number of lines multiplied by degree of difficulty, divided by the line standard.

315 Sirota, D., & Wolfson, A. D. Work measurement and worker morale: Need for changed managerial behavior. Business Horizons, 1972, XV (4), 43-48.

Discusses an experiment in a nonunion electronics manufacturing plant which increased productivity as much as 50% by instituting a work measurement system. While productivity increased, the morale of the work force decreased because some standards were found to be unfair and the employee appraisal process was time consuming. When changes were made in the system to allow first level managers rather than industrial engineers to decide on the fairness of standards, morale improved. Only about 18 percent of the hours covered were removed. Another finding was that morale improved even more significantly and productivity remained constant when this change was coupled with a reassignment of managers to different work groups. The implications of these findings for introducing work measurement systems and management change efforts are discussed.

316 Stevens, R. I., & Bieber, W. J. Work measurement techniques. Journal of Systems Management, 1977, 28 (2), 15-27.

The authors are practitioners of work measurement techniques with two major firms. In this article, they present a "typical" example of the application of a work measurement system to a work section. The article includes sample forms and a productivity improvement work program with time estimates.

317 Stevens, R. I. Ratio-delay study. Journal of Systems Management, 1979, 30 (2), 38-41.

The author offers a simple means of doing a work sampling study to evaluate clerical staffing levels. Three categories of activity were established and randomly scheduled observations were made to see how clerks and secretaries were spending their time. There are serious methodological questions about the use of secrecy and the treatment of personal time.

318 Young, S. L. Measures indirect work to boost performance. Industrial Engineering, August 1971, pp. 36-40.

The Operations Achievement Program (OAP), developed for use by a particular corporation, is intended to improve office, supervisory, and management productivity by utilizing industrial engineering work measurement techniques to apply to office activities. Time factors, or "should-take" times, are established for each logical element with the usual allowances for fatigue, personal time, and rest periods. Should-take time is then applied to present or planned workload volume to obtain workload hours "earned." "Realization," the ratio of earned hours to actual hours for a given job times 100, is a measure of staffing needs and payroll budget levels. A seven-step OAP implementation procedure is detailed. Through the use of OAP work sampling analysis, staff and managerial commitment, control charts, and weekly performance reports, management can have a useful "yardstick for identifying the presence of a problem before it becomes a catastrophe."

4.6. Human Resource Accounting

319 Bowers, D. G. Human resources accounting for the military. In L. Broedling & R. Penn (Eds.), Military productivity and work motivation: Conference proceedings. NPRDC SR 78-15, San Diego, CA: Navy Personnel Research and Development Center, August 1978.

Describes a methodology for developing a management information system that permits managers to relate current practices to future outcomes. This is needed since reliance on short term outcome measures may show near term success at the expense of future effectiveness or survival. Thus there is a need for process indicators as well as outcome measures. The author then describes a method for using Survey or Organization dimension scores for an organization to predict two criteria of future effectiveness: TVE -- total variable expense (a ratio of actual dollars spent to engineered standard dollars) -- and ABS -- total absence -- ratio of total days absent to total scheduled work days.

320 Dahl, H. L., Jr. Measuring the human ROI. Management Review, 1979, 68 (V), 44-50.

A manager of employee development and planning, at a pharmaceutical company, reviews his company's efforts to develop methods to measure the return on investment (ROI) in human resources. Utilizing human resource accounting and investment concepts, he analyzes the usefulness of four ROI measurement techniques--sales per employee, pre-tax earnings per employee, pre-tax earnings per $100 of payroll, and organizational value added (employee costs, capital expenditures, pre-tax earnings). The latter two measures, with a more realistic conceptual foundation, generated better ROI estimates for human resource utilization during the 1960-75 period.

321 Flamholtz, E. G. Human resources accounting: Measuring positional replacement costs. Human Resource Management, 1973, 12 (1), 8-16.

A variety of methods have been proposed for estimating the value of human resources in an organization. In this article the author develops the concept of "positional replacement costs." This term refers to the sacrifice--in economic terms-- that would have to be incurred today to replace an individual in a specified position with a substitute capable of providing an equivalent set of services in the given position. The model developed deals with three categories of costs: acquisition, learning and separation. After describing the model and illustrating its application in an insurance company, the author discusses the implications of the methodology for management and for accountants.

322 Likert, R., & Pyle, W. Human resource accounting: A human organizational measurement approach. Financial Analysts Journal, 1971, 27, pp. 75-84.

An alternative to the historical cost approach to valuing human resources is discussed. The approach borrows from social psychological research and is based on Likert's model of System 4 organizations. While the approach is discussed in conceptual terms with little in the way of specific application guidelines, it recognizes that the human organization is usually not represented in company balance sheets or earnings reports. It presents data to show that social psychological variables are highly related (R = .48 - .58) to future (1 year) financial performance of firms.

323 Pyle, W. Human resource accounting. Financial Analysts Journal, 1970, 26, pp. 69-78.

Using an historical cost approach similar to some methods used in valuing physical assets, the author describes a case study in a footwear manufacturing firm where human resource accounting was implemented. The article also addresses how the model developed for valuing employee assets may be used to account for customer assets.

324 Sangeladji, M. A. Human resource accounting: A refined measurement model. Management Accounting, 1977, 59 (12), 48-52.

The author proposes a system of human resources accounting for use in financial statements which reflect differences in management of human resources. The system uses present value of employee compensation, and proposes formulas for arrival at a discount rate and an employee productivity factor. This is held to be an improvement over human resource accounting systems which include only initial training costs.

325 Stone, F. Investment in human resources at AT&T. Management Review, 1972, 61 (10), 23-27.

Describes the application of human resource accounting to the measurement of turnover costs of telephone operators.

4.7. Program Evaluation

326 Hatry, H., Winnie, R. E., & Fisk, D. M. Practical program evaluation for state and local government officials. Washington, DC: The Urban Institute, 1973.

As suggested by its title, this book is a useful guide to government analysts, administrators, and program evaluators. The focus of this work is on methods of determining whether programs meet their intended objectives - or evaluation of effectiveness. The authors provide guidance on all phases of program evaluation including making the decision regarding when to evaluate, alternative evaluation designs, identification of objectives, criteria and clientele groups and methods for data collection. They provide sufficient examples to make the discussion concrete. The point of view of the authors is one of the decision maker and therefore the methods and their strengths and weaknesses are discussed in real world terms. While advocating the use of the most thorough evaluation strategies practicable, the book lives up to its claim of practicability by pointing out that compromises must sometimes be made due to cost considerations, political realities, or lack of data. After reading this book, the evaluator is in a better position to design an appropriate program evaluation plan within the constraints of the situation.

4.8. Financial Ratio Analysis

327 Flint, D. Economy, efficiency, and effectiveness--the "value for money" audit. The Accountant's Magazine, 1978, 82, pp. 245-249.

In order for local governments to reduce maladministration, waste, and extravagance in public expenditures in government, the author stresses that auditors must extend their financially-oriented expertise in the economy, efficiency and effectiveness of expenditures on public services. Audit standards, procedures, and criteria for measurement must be followed even though the basis for their certainty is more elusive when auditing the results of public agencies. The auditor is forced to inject to some degree his value system and judgment of "good value," "efficiency," or "effectiveness." These judgements must be professional opinions based on special knowledge, skills, and facts as ascertained when trying to establish the "value for money." The auditor's report must reflect correctly the measurement criteria used to audit the "value for money."

328 Kimmel, W. A., Dougan, W. R., & Hall, J. R. Municipal management and budget methods: An evaluation of policy related research: Final Report, Volume I Summary and Synthesis. Washington, DC: The Urban Institute, December, 1974.

The report identifies, evaluates, and synthesizes studies on the utility, impact, and effectiveness of management and budget methods for municipal management. Examples are Management by Objectives and Planning-Programming-Budgeting Systems. One method investigated was service effectiveness measurement. The most significant detail of the report, published in 1972, was the absence of any material on effectiveness measurement. Indirectly, it points out the need for productivity measurement in service-related industries. Findings relative to the other management and budget methods of management control are interesting from the perspective of the present. An excellent bibliography is provided.

329 Law, D. E. Measuring productivity. Financial Executive, 1972, XL (10), 24-27.

The author emphasizes that the true test of productivity and the fundamental measure of company effectiveness is the ratio of net income (output) to owner's equity (input). He assails the best-known methods of measuring productivity as at best a confused picture. After pointing out the weaknesses of these indices (Bureau of Labor Statistics' output per work-hour, industrial engineering's "earned" versus "actual" hours, and economists' dollar cost per work-hour and the value-added concept), he stresses that labor productivity is only one of the major factors affecting return on investment, the overall index of financial performance. Genuine productivity measures should be based on well-developed indices of product quality, sales performance, expense budgets, etc., to obtain company-wide measurement of financial performance.

330 Wilmott. R. A. Measurement of financial performance, Management Decision, 1977, 15 (1), 51-66.

From an economic analysis perspective, this author discusses considerations involved in selecting a productivity (efficiency) measure suitable for the firm. He rules out indices such as return on capital employed, profit per employee, and units of physical output in favor of value added per work-hour. Added value is defined as the difference between the sales value of goods produced and the cost of materials used and services purchased to manufacture those goods. The author included an analysis of six British hand tool manufactures.

4.9. Other Measurement Approaches

331 Dunnette, M. D., Milkovich, G. T., & Motowidlo, S. J. Possible approaches for development of a Naval personnel status index (NPSI). AD-7[illegible]102. Interim report for ONR Contract N00014-73-C-0210, NR 156-020. Minneapolis, Mi.. Personnel Decisions, Inc., July 1973.

Summary of ideas and suggestions of a group of experts assembled to consult on the development of a Naval personnel status index (NPSI). The discussion covers the topics of readiness measures, human resource valuation, organizational effectiveness, economic indicators, "quality" indices, and conceptual/psychometric considerations for developing a much needed personnel status index.

332 Landy, F.J. Developing scales for measuring obsolescence. Research Management, 1975, XVIII (4), 11-14.

The author describes a structured method for arriving at anchored scales for rating subjective phenomena such as obsolescence of people. The technique, known as "scaled expectations," focuses on actual behavior. The scale itself consists of a list of actual behaviors arranged in order according to the degree to which they manifest the subjective quality being measured. The development of the scale by staff members can be a useful exercise.

333 Sato, K. The Meaning and measurement of the real value added index The Review of Economics and Statistics, 1976, 58 (4), 434-442.

The author uses calculus to evaluate various statistical indices of real value added. He concludes that the Laspeyres index is a lower bound and the Paasche index an upper bound of the true index. The Divisia is the most appropriate index and approximates the true index under certain conditions, which the author describes.

334 Schmandt, H. J., & Stephens, G. R. Measuring municipal output. National Tax Journal, 1960, 13 (4), 369-375.

A "service output index" (SOI) is used to aid the statistical testing of the assumption that population size is unrelated to per capita municipal expenditures for 19 local governments in Milwaukee County, Wisconsin. The SOI is a detailed breakdown of the number of activities performed by a given functional area - e.g. police protection, which consisted of 65 activity categories. Although a gross and crude measure of the quality and quantity of output, the high significant correlations found between the number of activities and such variables as population, age of municipality, and total expenditures for a given service function suggest that the service level variable may be of use as a measure of service output in the public sector.

5. Related Bibliographies

335 Bibliography on major aspects of the humanization of work and the quality of working life. Geneva, Switzerland: International Labor Office, 1978.

A 300-page partially annotated bibliography containing over 2,000 citations of quality of work life literature drawing on research from 26 of the more industrialized nations. The bibliography contains the following sections: (a) relations between working conditions and job satisfaction, (b) other literature on job satisfaction, (c) new forms of work organization, (d) economic costs and benefits of new forms of work organization, (e) other aspects of the humanization of work and the quality of working life. The bibliography also contains an author index.

336 Bodoff, J. The effect of innovation in the service industries: Volume 3--Annotated bibliography. PB 247 722. Final Report for NSF Contract RDA 7516522, New York, NY: York College of the City University of New York, 1975.

Report is an extensive annotated bibliography of the effect of innovation on productivity in the service industries. The review covers literature appearing between 1960 and 1974 and is organized by reference type (e.g., books, dissertations, journal articles) into seven chapters: Distribution, Trades, Wholesale and Retail; Education; Finance; Banking, Securities and Insurance; Government Administration; Health and Medicine; Professional and Business Services and the Economy. Each chapter is preceded by a brief overview and index which addresses input, output and productivity measures.

337 Public Productivity Review, Volume I No. 4, Special Issue, Bibliography. New York: Center for Productivity Public Management, 1976.

This special issue of the journal is an annotated bibliography of articles, books and technical reports dealing with public sector productivity measurement and improvement. Organized by functional area and indexed, this is a very useful document.

338 Wise, C. R., & Norton, O. Productivity and Program Evaluation in the Public Sector: An Annotated Bibliography, Bloomington, IN: Indiana Midwest Intergovernmental Training Committee, 1978.

This annotated bibliography covers a wide range of topics relating to public sector productivity measurement and program evaluation. The 17 chapters fall logically into three content areas: first is a concern with the major facets of productivity, e.g., overview of the problem, methodology, management concerns, bargaining; second is a review of productivity initiatives at Federal, state, and local governmental levels; and third are reports of specific efficiency and effectiveness measurement initiatives in 10 selected governmental areas, e.g., education, fire services, law enforcement, recreation services, solid waste.

While making no claim to be exhaustive in its coverage, this document will provide a reader with a good overview of the status of public sector productivity measurement. The annotations are complete enough to provide a reasonably good assessment of the original work.

339 Work in America Institute Studies in Productivity, Highlights of the Literature, Scarsdale, NY: Work in America Institute, 1978.

These 11 volumes cover a wide range of topics which impact directly on some facet of productivity measurement or enhancement. The volume numbers and titles are listed below:

1. Mid-Career Perspectives: The Middle Aged and Older Population
2. Productivity and the Quality of Working Life
3. Trends in Product Quality and Worker Attitude
4. Managerial Productivity
5. Worker Alienation
6. Human Resource Accounting
7. New Patterns of Work
8. Occupational Stress and Productivity
9. Redesigning Work: A Strategy for Change
10. Jobs and the Environment
11. Changing Attitudes toward Work.

Each of the 11 volumes includes a summary of research in the topic area followed by an annotated bibliography of relevant articles and an extensive list of recommended readings. This series, although written in somewhat academic style, provides an efficient way to survey a wide range of literature and "to become acquainted with the current development, ideas, and trends that are shaping the emerging world of work."

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